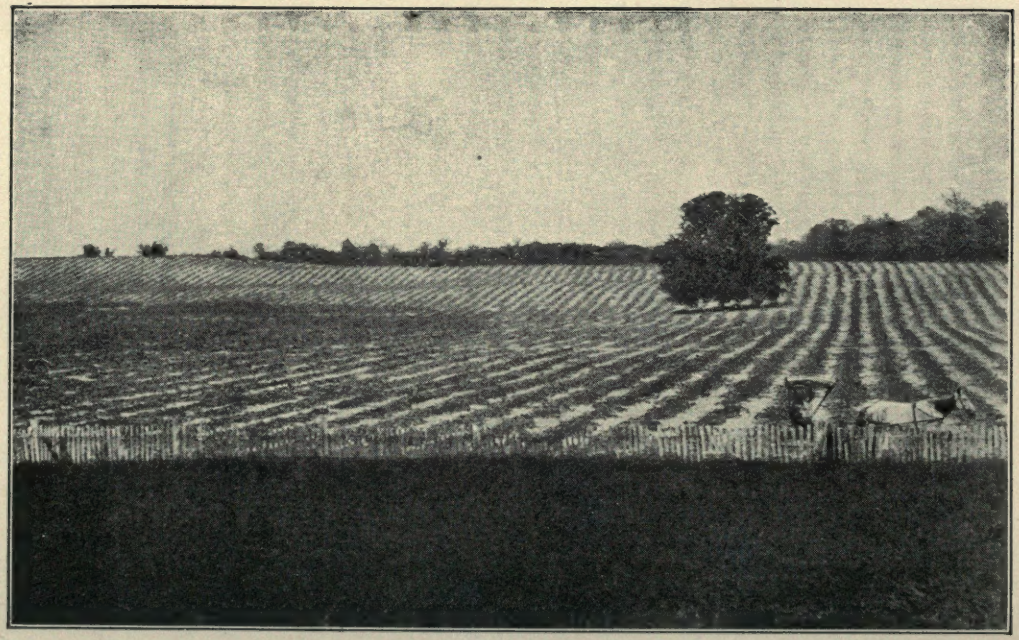
UNIVERSITY OF TORONTO
3 1761 01208021 4

MELON CULTURE

JAMES TROOP

SB
339
T85
1918

Presented to
The Library
of the
University of Toronto
by
the Estate of
Robert A. Johnston



A FINE FIELD OF MUSKMELONS.

Melon Culture

A Practical Treatise

on the

Principles Involved in the Production of Melons, Both for Home Use and for Market: Including a Chapter on Forcing and One on Insects and Diseases and Means of Controlling the Same

By

JAMES TROOP

Professor of Horticulture and Entomology
Purdue University, Lafayette, Indiana

ILLUSTRATED

NEW YORK
ORANGE JUDD COMPANY
1918

SB
339
T85
1918

Copyright, 1911, by
ORANGE JUDD COMPANY
All Rights Reserved

852217

PRINTED IN U. S. A.

PREFACE

Melon growing has come to be an industry of vast proportions in this country, few people having any adequate conception of the extent of the industry. There is scarcely a state in the Union in which the melon does not play a more or less conspicuous part in its vegetable productions. Even Canada, which is generally considered as being too far north for melon growing, produces some surprisingly fine melons, especially in the eastern portion, where they are grown quite extensively under frames. The United States is, however, the principal field for outdoor melon culture, and it is to this section mostly that the following pages are intended to apply.

The results of the census of 1910 are not yet available, but, basing our calculations on the report of the Census Bureau of 1900, and making a fair allowance for increase in acreage and production during the last decade, we now have in the United States in round numbers 290,000 acres devoted to melon growing. This is divided between the muskmelon and the watermelon in the proportion of about one to three. The yearly production, according to these estimates, would be about 175,000,000 muskmelons and 225,000,000 watermelons, or more than four melons to each person in the United States. We see, therefore, that this is no mere market garden crop, but that it covers vast areas. Commercially speaking, therefore, it may be classed among the farm crops of the present day.

Twenty-five years ago this industry was confined to a few southern states and near the large cities of the East. The number of varieties was also limited. Peter Henderson in his "Gardening for Profit," published in 1891, mentions only six varieties of muskmelons and ten varieties of watermelons in general cultivation; that number has since increased many times over. Methods of cultivation and handling the crop have improved wonderfully, and while the yield per acre is perhaps no greater yet the crop is produced much more easily and with less expense than formerly. Insects and diseases have become more troublesome, but they are also better known, and, with possibly one or two exceptions, are more easily controlled.

It has been the aim of the writer in the following pages to give the latest information concerning the needs of this crop, as to soil and climate, and directions for planting and cultivation which will apply to the small grower for home use as well as to the large commercial grower. The principal species of insects and diseases are also described and remedies recommended so far as any are known. A list of the more common varieties is also given.

The illustrations are, for the most part, from photographs taken in the melon fields or from individual specimens or crates. The greater portion of them were taken by my colleagues, J. G. Boyle and C. G. Woodbury, and some of them have been used in bulletins published by the Indiana Experiment Station. Figs. 14 and 21 are from photos furnished by D. V. Burrell of Rocky Ford, Colorado.

CONTENTS

CHAPTER I

Page

History and Botany of the Melon . 1-8
Early history of the muskmelon and watermelon—Botany of each—Botanical varieties—Structure and pollination of flowers.

CHAPTER II

Conditions Affecting Growth . . 9-13
Climatic conditions—Soil conditions—Tile drainage—The function of root hairs.

CHAPTER III

Soils 14-17
Best soils for muskmelons—Best soils for watermelons.

CHAPTER IV

The Seed 18-29
Conditions affecting the vitality of seeds, temperature, moisture, age, etc—Testing seeds; methods employed—Selecting seeds; its influence on the crop—Seeds from immature fruit—Early vs. late ripening fruits for seeds—Effect of latitude and altitude on early maturity.

CHAPTER V

Fertilizers for Melons 30-34
Kind and quantity for different kinds of soils.

CHAPTER VI

Page

STARTING THE PLANTS 35-40
Planting in the open ground—Time to plant—Use plenty of seed—Starting in hotbed—Planting in plant boxes or on sods—Watering—Temperature—Starting in hothouses.

CHAPTER VII

CULTURAL METHODS 41-45
Transplanting—Plants required for an acre—Distance apart for the hills; for muskmelons; for watermelons—Cultivation: deep vs. shallow—Navy beans as anchors for the vines.

CHAPTER VIII

HARVESTING AND MARKETING MELONS . 46-60
Proper stage of ripening for harvesting in order to preserve quality—Protecting the melons after picking—Packing as it is usually done; as it should be done—Style of package used—Shipping in bulk—Marking the package with grower's name and address—Marketing—Conditions affecting the profits—Number of watermelons required to fill a car—Extent of the melon business.

CHAPTER IX

FORCING MELONS 61-67
Some of the necessary requirements for forcing melons—The forcing house—The soil for the house: how made—Watering: sub vs. surface irrigation—Planting the

Page

seeds—Time for early and late crop—Training to strings or wires—Fertilizing the blossoms—Market—Varieties—Insects—Diseases.

CHAPTER X

INSECTS AND DISEASES 68-69

The common forms, with remedies—Mice and gophers or ground squirrels—Fungous and bacterial diseases of melons—Disease-resistant plants.

CHAPTER XI

LIST OF VARIETIES 90-101

A description of fifty-five varieties of muskmelons grown out-of-doors and nine foreign varieties—A list of good forcing varieties grown in this country—A description of forty-six varieties of watermelons.

LIST OF ILLUSTRATIONS

Figure		Page
	A fine field of muskmelons—*Frontispiece.*	
1.	Muskmelon vine, showing female blossom at *a*, and male blossom at *b.*	3
2.	Section of watermelon field in the Ohio valley which yielded $150 per acre.	16
3.	Seed-testing box filled with corn after the melon seeds had germinated	21
4.	A poor Netted Gem, the result of haphazard selection of seed melons	23
5.	A much better type than Fig. 4	24
6.	A bunch of well-grown Rattlesnakes	32
7.	Hotbeds where the melon seeds are started	38
8.	This is easier than watering by hand	39
9.	Hauling the plants to the field for transplanting	43
10.	A thoroughbred Rocky Ford	47
11.	Harvesting cantaloupes and hauling them to market	49
12.	A typical packing shed	50
13.	Some different styles of packages	54
14.	A fine bunch of Burrell Gems; note the uniformity of size, shape and netting	56
15.	A handy screen for fencing out the striped beetle	71
16.	A field of Tip Tops nearly ruined by the bacterial wilt	80

Figure		Page
17.	A field of melons destroyed by the rust	84
18.	The rust may be held in check by spraying with the bordeaux mixture	85
19.	A rust-resistant Rocky Ford; note the fine netting	87
20.	A well-sprayed melon vine	88
21.	The Rocky Ford is a favorite variety with most growers	90
22.	A trio of Tip Tops from the Ohio valley	91

CHAPTER I

HISTORY AND BOTANY OF THE MELON

Both the muskmelon and the watermelon are natives of tropical countries, where the muskmelon, in particular, has been cultivated from the earliest period of which we have any record. The muskmelon is a native of southern Asia, where it was known to and cultivated by the Israelites before the time of Moses. During their travels through the wilderness, where they were fed by the manna from heaven, they became impatient and said to Moses, "We remember the fish, which we did eat freely, the cucumbers, and the melons." And Isaiah, in speaking of the desolation of Judah, says, "The daughter of Zion is left as a cottage in the vineyard, as a lodge in the garden of cucumbers."

It would seem from the foregoing that the cucumber and the melon were cultivated together then as now. Some writers, however, think that the cucumbers mentioned were really melons, although both are mentioned. It is very probable that in those early times the names were used interchangeably, inasmuch as the two are so closely related. From Asia the muskmelon was introduced into Europe at about the beginning of the Christian era. At about the same time the watermelon was brought into Europe from the southern or central portion of Africa, its native habitat, from whence it has kept pace with the muskmelon in its journeys into all of the tropical and semitropical countries of the civilized world.

Melons have been grown in the United States from its early history, but until comparatively recent times their culture was confined to the eastern and southeastern states along the southern coast. In some of the writings of the early part of the last century mention is made[1] of a number of varieties having been shown at the exhibition of the Massachusetts Horticultural Society; and in 1851 the same author speaks of the Christiana melon as having been raised by Captain Josiah Lovett from a green Malta melon impregnated with a very early variety, and it was believed that it had not been equaled. In order to show their appreciation of its merits, the society awarded Captain Lovett a piece of plate of the value of $50. A little later, melons weighing from 40 to 50 pounds were exhibited, and the quality was all that could be desired. Within the last 50 years the cultivation and improvement of the melon has steadily increased, and the number of varieties which are suited to different soils and climates has gradually grown, until the United States is acknowledged to be the largest melon-growing country in the world.

Botany.—The muskmelon and the watermelon both belong to the natural order *Cucurbitaceæ*, from the Latin, *Cucurbita,* meaning a gourd. This order[2] contains plants that are mostly tendril-bearing herbs, with succulent but not fleshy herbage, watery juice, alternate palmately ribbed and mostly lobed or angled leaves, monoecious or sometimes dioecious flowers; monoecious, when flowers of both sexes are borne upon the same plant but only one

[1] "History of the Massachusetts Horticultural Society."
[2] Gray's "Botany."

sex in the same flower; dioecious, when the two sexes are borne on different plants, as is the case with the poplars, willows, etc., in which case one plant is fertile and the other is sterile, although both are necessary to the production of fruit.

In the melons, the flowers are usually monoecious, the calyx coherent with the ovary, corolla more commonly monopetalous—united into one—and stamens usually three, of which one has a one-celled, the others two-celled anthers, but the an-

Fig. 1. Muskmelon vine showing female blossom at *a*, and male blossom at *b*.

thers are commonly tortuous, twisted and often all combined in a head and the filaments sometimes all united in a tube or column. In the muskmelon, the sterile or male flowers are borne in clusters with short stems, the fertile ones are solitary and mostly on short stems in the axil of the leaves. (See Fig. 1.) In the watermelon the two kinds of flowers are solitary in the axil of the leaves.

The muskmelon belongs to the genus *Cucumis,* to which belongs the cultivated cucumber of our gardens, and Linnæus gave it the specific name *Melo. Cucumis melo* is therefore its botanical name. Its

leaves differ somewhat from those of the watermelon in that they are roundish, heart-shaped or kidney-shaped, the lobes being rounded, while those of the watermelon are deeply three to five-lobed, and the divisions again lobed or sinuate pinnatifid, pale or bluish. The fruit is of varying size, with a more or less hard rind and sweet flesh, the edible part being the inner portion of the pericarp, the thin and watery placentæ being discarded with the seeds.

There are a number of more or less distinct botanical varieties, which are classified according to the shape, size and character of the fruits, some of which are cultivated more for ornament or as curiosities than for domestic use. The first two of these varieties mentioned below include the greater portion of our commonly cultivated muskmelons, and formerly served to separate them into two groups; viz., cantaloupes and nutmegs, but these names are now often misapplied by the general public, and the two groups have become so confused that it is now scarcely possible to separate them; in fact, the strictly pure cantaloupe is not grown much in this country. Our cultivated varieties, which commonly go by the name of cantaloupes, are really nutmegs; but if one wishes to be perfectly proper in speaking of them, he should call them all muskmelons, and let that suffice.

BOTANICAL VARIETIES

Variety *Cantaloupensis* is the cantaloupe. The fruits are usually hard-rined, more or less roughened or warty and often with deep furrows running

lengthwise. The name is derived from Cantalupo, near Rome, a former country seat of the Pope, whither this type of melon was brought from Armenia.[1] In this country, as stated above, the name cantaloupe is often applied to muskmelons in general, no distinction being made between varieties, whereas it should only be used in connection with those having a hard, scaly rind.

Variety *Reticulatus* includes the nutmeg or netted melons. Here the rind is more or less soft, netted or sometimes smooth. The Emerald Gem is a good example.

Variety *Flexuosus* is the so-called Snake Melon or Snake Cucumber. The fruits are long and slender, variously curved, nearly green when ripe, sometimes two and one-half to three feet in length and about three inches in diameter. It is sometimes used by the housewife in making preserves.

Variety *Chito* goes by various names: Orange Melon, Mango Melon, Melon Apple, Garden Lemon, Vegetable Orange, etc. It is smaller and more delicate in vine than the common muskmelon and, as the name indicates, the fruits are much the shape and size of an orange, yellow in color, without markings, and without the characteristic melon odor. They are used only in making preserves.

Variety *Inodorous* includes the winter melons. The leaves are lighter in color and less hairy than the ordinary melon. The fruit is mainly noted for its keeping qualities, as with proper attention it may be kept well into winter. This variety is not very well known in the United States, where there are so many superior varieties, and so its culture is

[1] "Encyclopedia of Horticulture."

limited, for the most part, to the countries bordering on the Mediterranean Sea.

The *Watermelon* belongs to the genus *Citrullus*, the name coming from the Latin word *Citrus*, meaning an orange or citron. Its specific name is *vulgaris*, signifying the *common* melon; hence, *Citrullus vulgaris* is its botanical name. The edible pulp of the fruit, in which the dark seeds are imbedded, consists of the large and juicy placentæ, which are usually reddish in color. The so-called citron of the garden is a variety of the above species with a hard and firm flesh, which is used for making preserves.

Fertilization of the Flowers.—By referring again to the description of the flowers, it will be seen that plants belonging to either of these groups must depend upon some outside agency for pollination, as the pollen must necessarily be carried some distance before it can come in contact with the pistil. In nature this is amply provided for by bees and other insects, which visit the flowers for the purpose of gathering the nectar or pollen, and also by the wind, which carries the pollen for a considerable distance and deposits it upon the pistils. It is not a good plan, however, to depend upon the wind entirely for pollination, as experiments have proven that in many instances where the insects were excluded from the blossoms, no fertilization took place and the crop was a failure, although the wind had free access to the flowers. It is a good plan, therefore, for the melon grower to combine bee keeping with his melon growing, as this will nearly always insure a good stand of fruit.

It sometimes happens that just as the blossoms are beginning to appear and are nearly ready for

the pollen there comes a time of long-continued rainy weather, which prevents the bees from working or the wind from blowing the pollen. This may result in the crop being later than usual, or it may cause a break in the continuity of ripening later on. As a general thing, however, a rain which lasts only a day or two will have but little or no effect upon the fertilization of the flowers, because nature has provided for just such emergencies, and so if the pollen is not there when the pistil is ready to receive it, it simply waits for a reasonable length of time until it can be served. This can be shown very nicely by observing the common, cultivated carnation as grown in the greenhouse. If pollen be applied to the pistil as soon as it is ready for it, the blossom will wither and dry up within two days; whereas, if the pollen is withheld, it will remain open for two weeks, simply waiting for nature to perform her duty.

Forcing melons, or those which are grown in the greenhouse or forcing houses, must be hand pollinized, as there are no insects and very little wind to distribute the pollen. Hand pollination is easily performed by simply taking a piece of clean glass and holding it under the mature male flowers. Then, by gently tapping the flower with a stick or lead pencil, the pollen will be jarred off on to the glass. It will require several flowers to produce sufficient pollen to make the work easy and absolutely certain. Then, with a small camel's-hair brush, brush the pollen into a little heap and dip the end of the pistil into it. If the pistils are ready to receive it, one application will be sufficient, but in order to be

absolutely certain, another application may be made the next day.

As said before, however, the pistils will remain in a receptive condition for some time if necessary. This fact makes it very convenient for the experimenter who wishes to cross-fertilize varieties of melons, for all that is necessary is for him to select his female blossoms, or buds, and cover them, just before they open, with paper sacks, leaving them on until the blossoms are fully open in order to prevent them from becoming pollinized from an unknown source. Now get the pollen in the manner indicated from the variety you wish to use as the male parent, slip off the cover and apply it to the waiting pistil and replace the covering, leaving it there until you are sure that fertilization has taken place. This is the method employed by the experimenter when he wishes to produce new varieties by using parents of certain definite known characteristics.

Another method of applying the pollen, which is preferred by some, is to take a camel's-hair brush and moisten it with the breath, then brush it over the mature stamens of the male blossom, when enough of the pollen will adhere to it to supply the pistils as it is applied to them. Others have good success by simply pinching off the mature male flowers and after removing most of the corolla, applying the stamens to the pistils. There are various methods of performing the operation, but the results are the same.

CHAPTER II

CONDITIONS AFFECTING GROWTH

Climatic Conditions.—As stated in the previous chapter, the melon is strictly a warm-weather plant, both the muskmelon and the watermelon coming from tropical or subtropical countries. Like many other warm-weather plants, however, they have gradually worked their way northward, until they are now both freely grown in many parts of the north temperate zone. Neither of the species have, however, reached the point in hardiness where they will stand a temperature which even approaches the freezing point.

It is useless, therefore, to attempt to grow melons in outdoor culture by planting them before all danger of frost is over and the minimum temperature of the air has reachel 60° or higher. As will be seen farther on, some time may be gained by starting the seeds in a hotbed or greenhouse, and transplanting to the open ground later on, but even this must not be done until the atmosphere has become thoroughly warmed up. This will be indicated in different sections of the country by the time when Indian corn is usually planted.

Soil Conditions.—If the seeds of almost any of our upland plants are planted in soil which is cold, or which has not been properly drained, they will either rot or remain in the soil in a dormant condition until it has reached the proper temperature. This is especially true with such plants as those

now under consideration. So it is generally a waste of time and material to plant the seeds before the soil is ready to receive them.

It is a custom with many farmers, especially in the corn belt of the middle West, to begin planting their corn at a certain day of a certain month, regardless of the fact that the season may be ten days or two weeks later some years than others. As a result, the farmer is often obliged to replant his corn on account, as he claims, of poor seed; but by using the same kind of seed for the second planting, a good stand is generally secured, because, in the meantime, the temperature, both of the soil and air, has been raised to the point which the corn requires for germination and rapid growth. Melon seeds require fully as high soil temperature for germination as does corn; in fact, they are much alike in this respect.

Tile Drainage Helps to Warm Up the Soil.—There are large areas of the better class of melon soils in the United States which do not need artificial drainage because both the soil and subsoil are of a porous nature and the water level is so far below the surface that it does not interfere with the warming-up process but rather accelerates it. In these soils the capillary action is almost perfect, and so it does not matter much how dry the season is, the roots of the plants will always find moisture close at hand. In many sections, however, where melons are grown, a clayey subsoil underlies the looser surface soil, and this has a tendency to hold the free water and to keep the surface cool.

Tile drainage under such conditions will assist very much in lowering the water level, and so allow-

ing the excess moisture to escape and the warm air to penetrate to a greater depth. It must be remembered that oxygen is as necessary to the healthy growth of these plants as it is to the animal. The cells of the newly formed roots are filled with that life-giving principle called protoplasm, and they must have access to the oxygen of the air or they will soon die.

The late Prof. E. S. Goff[1] illustrates this in this way: Take a quantity of water and boil it for a time, so as to expel the free oxygen and then cool it quickly. A portion of it is then placed in a glass and oil is poured over it, so as to prevent the reabsorption of air. Leave the remainder exposed to the air for some time until it has reached the normal condition. Now take cuttings from some free-rooting plant, like the geranium or tomato, and insert one into each of the glasses. In the glass containing the oil over the top the cutting will soon die, because there is no free oxygen in the water, while the one in the other glass, which has been left exposed to the air, will soon send out its rootlets and continue to grow.

Or, take the same kinds of cuttings and place them in a soil where the free water is within six inches of the surface. Make the cuttings long enough so that the lower ends will extend down into the free water. It will be found later on that the cuttings will have thrown out roots above the water level, but not from the ends which were in the soil which was saturated with moisture and consequently devoid of free oxygen.

[1] "Principles of Plant Culture."

The Function of Root Hairs.—The absorption of plant food is accomplished by means of very fine root hairs, which may be seen very nicely on melon roots which have grown between folds of muslin or thick paper. These root hairs play a very important part in the growth and development of the plant, but they cannot perform their natural function in the absence of free air. This condition exists in soils that either contain an excess of moisture or that have been worked while they were in this condition, thereby causing them to bake.

The ideal soil for this class of plants, therefore, must contain enough plant food and water to fully supply the plants and yet be so porous that the air can circulate through it and come in contact with the roots. Each particle of such a soil is surrounded with a thin film of water, while between the particles are spaces connected with each other and filled with moist air that is in communication with the air above the soil. The root hairs apply themselves intimately to the wet surfaces of the soil particles, or extend themselves into cavities filled with saturated air, and are thus able to draw in the well-aerated soil water with its dissolved food constituents in sufficient quantities to restore the loss from transpiration and to distend the newly formed cells.

It must be remembered that the soil is Nature's great chemical laboratory, in which many changes are going on constantly; by decomposition, the countless millions of plants and animals are acted upon by myriads of bacteria, whereby nitric acid, which supplies the higher plants with their most useful food element—nitrogen—is formed. The carbonic acid which these plants took from the air

during growth is also set free to slowly disintegrate the mineral elements, rendering these soluble and available as plant food. In winter the frost acts upon the hard, compact particles, separating them and making them permeable to air and unlocking new supplies of plant food that would otherwise be unavailable.

Our upland crops secure a large portion of their nitrogen, as well as other food constituents, from decaying animal and vegetable matter, and it is of very great importance for such plants as melons, which must complete their growth in a comparatively short period, that as much of this material be made immediately available as possible. The application of well-rotted barn manure or commercial fertilizers, which act quickly by giving up to the plant the necessary food elements in an available form, is, therefore, especially valuable.

Drainage is also essential in land that is inclined to be heavy or where the water table is too near the surface, because it serves to promote aeration by removing the surplus water and places the particles of soil in the proper relation to moisture for the reception of the plant roots. Plants of the nature of those under discussion will not thrive with wet feet.

CHAPTER III

SOILS

For Muskmelons.—Most writers on muskmelons advocate the selection of rather heavy, sandy loams for the best success in commercial melon growing, for the reason that the muskmelon seems to require a soil which contains an abundance of vegetable matter on which the plant can draw for its food supply during the entire season, rather than during a comparatively short space of time. While it is true that the muskmelon can be grown successfully on almost any good loamy soil, it is a fact that in the melon regions of the middle West, as well as in the South, the sandy soils are almost universally selected for commercial purposes where it is possible to do so.

Some of the most successful growers in the Ohio and Mississippi valleys select a sandy soil that is rich enough, or that can be made rich enough, to produce a good stand of clover. Then, in order to put it in the best possible condition for melons and to keep it so, they arrange a three or four-year rotation, starting with clover, then melons, then wheat, and then back to clover for one or two years. By this process a minimum amount of manure is required to keep up the fertility, as these crops furnish a good supply of humus in the soil, and what manure is used for the melons is usually applied in the hills, although some broadcast it for muskmelons, as the hills are much closer together than in the case of watermelons.

As soon as the melon crop is harvested, they simply disk the ground with a disk harrow and sow to wheat, sowing clover with the wheat in the spring. This is either pastured or cut for hay and the land prepared for melons again the third or fourth year. Some add corn to this rotation, which is not a bad idea, as it adds another year to the time allotted between the melon crops. This process seems to fulfill the requirements of the melon plants very nicely, as it gives them a seed bed that is full of nitrogen, which will cause the plants to respond very quickly and grow rapidly, and enables them to overcome the attacks of insects and diseases with which they have to contend.

The sandy land is also selected because it warms up more quickly and can be worked earlier in the spring. It does not need much artificial drainage, it does not bake after heavy rains, and consequently may be put into condition to receive the plants or seeds with less labor than can the heavier soils. Then, again, the crop will begin to mature earlier on the sand than on clay, which in itself is a very important consideration from the money standpoint. All of these points must be kept in mind by the successful melon grower.

For Watermelons.—The watermelon, like the muskmelon, is an all-season plant, as well as a strictly warm-weather plant, and this applies to the underground system as well as to that portion which grows above ground. But while the muskmelon will produce good crops on a moderately heavy soil, the watermelon is at its best only on a deep, light, warm, sandy soil.

It would be folly to attempt to raise watermelons,

Fig. 2. Section of watermelon field in the Ohio valley which yielded $150 per acre.

in a commercial way at least, on a cold, wet soil. In the first place, the seeds would most likely rot before they could have time to germinate, and if some of them did succeed in germinating, the plants would make only a feeble growth, and the crop would amount to nothing. To be sure, some fairly good melons may be grown, on a small scale for family use, on almost any good loamy soil, providing it is well drained and not too rich in nitrogenous material so as to produce a luxuriant growth of vine at the expense of fruit; but the farmer who has only a heavy, clay soil or rich bottom land, had better devote his energies toward raising wheat and corn, and buy what watermelons the family needs; because, if he attempts to raise them under such conditions, he will only meet with disappointment. But if he can find a patch of light sand on the place, by using plenty of fertilizer, he can raise the finest kind of melons.

Nor is there much danger of the sand being too light and porous. Some of the best watermelon land that can be found anywhere may be found in sections of the Ohio and Mississippi valleys where the sand is so light and loose that farmers are sometimes obliged to haul straw and place it in the road in order to be able to haul their melons to market; and yet that soil retains the moisture and plant food sufficient to produce heavy crops of melons of the highest quality during the driest seasons. (See Fig. 2.) Corn also forms a part of the rotation on some of these lands, and from fifty to seventy-five bushels per acre is often produced. Much of this is due to the ability of these soils to retain moisture and to furnish it to the plants as needed.

CHAPTER IV

THE SEED

There are so many factors which enter into the seed proposition, that it becomes a matter of vital importance to the melon grower. And one of the very first essentials is that of good, sound seeds—seeds which have been properly handled and have not lost their vitality. While melon seeds will retain their germinating powers for a number of years if the proper conditions are maintained, yet it is comparatively easy to destroy their vitality by improper care.

Some of the conditions affecting the duration of seed vitality were set forth by the late Prof. E. S. Goff of the University of Wisconsin. One of the most important conditions is a uniform degree of humidity and temperature.[1] So handling the seeds as to cause as little drain as possible upon the life of the living cells tends greatly to prolong the vital period of seeds. Seeds deeply buried in the ground are often capable of germination at a great age, because in such cases the seeds are subjected to practically no variations in humidity and temperature.

Seeds of many of our common weeds which have been plowed under quite deeply remain in the soil in perfect condition for years until they are again brought to the surface, when they germinate and grow. The writer has carried on experiments along this line by placing seeds of some of our common

[1] "Principles of Plant Culture."

garden vegetables in bottles and burying them in the ground about two feet deep; after 20 years, they were taken up and tested for germination, when it was found that nearly as high a degree of vitality was maintained as we commonly get with fresh seeds.

Moisture is another factor which must be reckoned with in maintaining the vitality of stored seeds. Seeds that are kept too moist are very likely to develop fungous diseases which may result in the destruction of the germ or embryo. Freezing at such a time, except in case of those seeds which require freezing in order to burst the hard covering, may also destroy the vitality of the seeds. It is highly important, therefore, that seeds like those of the melon should be carefully dried as soon as they are separated from the pulp, and kept in a moderately warm and dry atmosphere until planted.

The age of the seeds often has much to do with the germinating power. With some species, better results are obtained if the seed is not more than a year old. The onion is a good example of this class, but melons or cucumbers may be grown successfully from seeds that are five or, in some cases, even ten years old. It is said by successful melon growers, that the best results are usually obtained from seeds which are two or three years old, providing, of course, they have been properly handled. The fresh seeds will often produce the greatest degree of luxuriance of plant and foliage, but the fruiting qualities come with age. It is highly important, therefore, if the melon grower saves his own seeds, which is often the case, to save enough during favorable seasons to last for a number of years; or, in

other words, to constantly have a supply of two or three-year old seeds on hand.

Testing the Seed.—There is, perhaps, not so much necessity for the melon grower to test his seeds as there is for the general truck grower, or the grain farmer, because, as we have already seen, melon seed will retain its vitality for a number of years if properly cured and stored, and so there is not so much danger of getting seed which has lost much, if not all, of its vitality on account of age. Formerly it was not an uncommon thing for seedsmen to keep over any surplus seeds from one year to another in order to guard against any possible failure of the seed crop the following season. In case of a shortage in any crop, these old seeds could be mixed with the new, and still the new crop would maintain a fairly respectable percentage of germination. I do not believe that this is the case now, however, especially with our old and well-established seed firms, but, instead, their seeds are all tested for germination before they are sent out. Nevertheless, the melon grower has quite as much at stake as has the general farmer when he plants his crop, and so it behooves him to make himself absolutely sure that his seed is going to grow, as upon this fact depends success or failure.

How to Test the Seed.—If there is a little space in the hotbed that will not be occupied for a few days, the seeds may be sowed in a flat or shallow box and set in the hotbed, where the conditions will be most favorable for germination. One hundred seeds of each of the lots to be tested will not require much room, and the percentage of germination may be easily reckoned. If ten per cent, or

more, of the seeds fail to germinate, it will then be best to add to the number of seeds planted, for it is much cheaper and safer to thin out than to be obliged to replant. If one has no hotbed, all that is necessary is to take a couple of dinner plates; on one place a piece of muslin or canton flannel, moisten it, place 100 seeds upon it so they will not touch each other, place another piece of damp cloth over them and turn the other plate bottom side up

Fig. 3. Seed-testing box filled with corn after the melon seeds had germinated.

over the whole to prevent evaporation, and set the whole in a warm place for a few days, when they may be counted out and the percentage of germination ascertained. Another inexpensive seed tester is shown in Fig 3. It is simply a shallow box or tray, of almost any dimensions not too large to be easily handled, with wires stretched across in both directions, two inches apart each way. This will make little pockets or squares large enough to hold

five or ten melon seeds. This flat is then filled with clean sand which has been dampened, the seeds put in place as indicated in the cut, and the whole covered with glass in order to prevent evaporation, and placed in a warm room for a few days. It is an easy matter then to count out and figure the per cent of those which have germinated. This requires but very little labor and expense, and the satisfaction of knowing that the seeds are going to grow will add greatly to one's peace of mind.

Selecting Melons for Seed; Its Influence on the Crop.—It is pretty generally understood by those who have given the matter attention that there are a number of influences at work in the production of a melon crop concerning which the average farmer or gardener knows but little, or if he knows about them, he seldom if ever attempts to follow them out to their logical conclusions. For example, take the matter of selecting melons for seeds for future planting. A little observation will show one that, in most cases, the most haphazard methods are practiced by the growers who save their own seeds. To be sure, many of the large commercial growers have a kind of standard which they follow, but in most cases they do not follow out their selection with reference to any logical sequence. For example, each grower has his own idea as to the size and shape of the melon which he wishes to grow, and he selects fruits for seeds along those lines entirely, disregarding two of the most important points which go to make a perfect and profitable melon; viz., productiveness and quality.

Instead of going into the field and selecting the type of melon wanted from the most productive

hills, and then testing the quality of the fruit before saving the seeds, the more common practice is to wait until the wagon comes from the field with a load and then to select the seed melons from this promiscuous lot. (See Fig. 4.) In this way the grower may be able to preserve the type of melon he wishes to grow at the expense of those other very important qualities. This is like the old

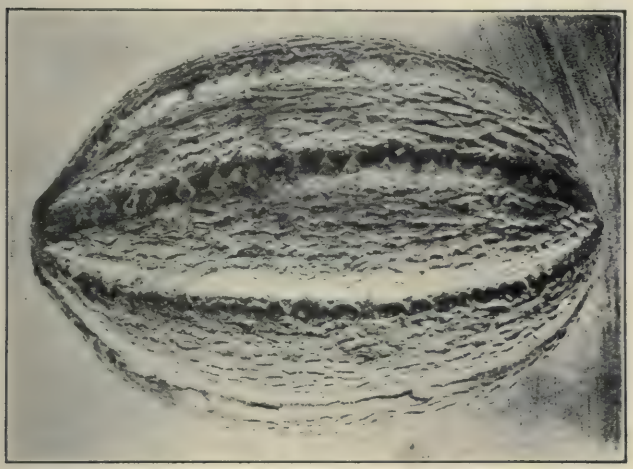


Fig. 4. A poor Netted Gem, the result of haphazard selection of seed melons.

method of saving seed corn by waiting until planting time and then going to the crib and selecting the type of ear wanted without knowing anything about the kind of plant from which it came.

Many experiments have been tried along this line, not only with melons, but with other crops as well, all of which tend to prove the truth of this state-

ment. Individual hills grown from the same lot of seeds, as we get them in the market, and given the same treatment in every respect, will often vary in their productive powers from 25 to 200 per cent. It is often the case, however, that the unproductive hill will produce fruits which are as true to the type as the more productive plants; hence, the selecting of the melons for seed in the field, as they are taken

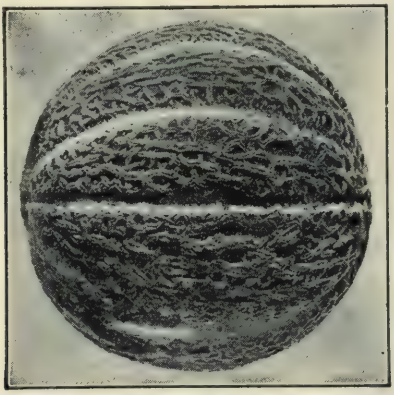


Fig. 5. A much better type than Fig. 4.

from the vine, where all of these characters may be taken into account, becomes a matter of great importance. (See Fig. 5.)

Prof. P. K. Blinn of Rocky Ford, Colorado, found that, by planting the seeds from a single melon separately, the product of this melon was so uniform in all of its qualities that it was evident to him that the individual selection must be considered an essential point in breeding, not only for type, quality and productiveness, but in securing strains which

are disease-resistant. Hence, it is not only important to select from individual plants, but individual fruits as well; and then, too, we should separate the breeding plots as far as possible to prevent any undesirable crosses.

Seeds from Immature Fruits.—In general, seeds that are gathered from immature fruits will produce an earlier ripening crop, but a more delicate and weaker-growing plant; and if this process is followed up for a few generations, we will have the crop "running out," simply because the plants have lost their vitality. Seeds from such immature fruits are much more difficult to germinate than are those from well-matured fruits. Seeds from immature fruits seem to have trouble in throwing off their seed coats and getting their roots established in the soil. Many of them perish during the germination period.

Such seeds, too, do not weigh more than two-thirds as much as those from fruits that are fully ripe; consequently, the young plantlets lack constitutional vigor and are more easily affected by retarding or harmful influences. If they can be brought through the early period of growth and become well established, and the foliage or fruit is not attacked by rots or blights, the grower will usually be rewarded by an earlier and more abundant crop of slightly smaller and less firm fruit. These characters will be more strongly emphasized in subsequent years by continuous seed propagation along these lines.[1] Goff states[2] that seeds not fully grown lack a part of their normal food supply and their

[1] J. C. Arthur.
[2] "Principles of Plant Culture."

embryo is probably imperfectly developed. If capable of germination, they rarely, if ever, produce vigorous plants.

As a rule, the most vigorous plants come from fully matured seeds. Immature seeds, persistently used, probably tend to reduced vigor, early maturity, dwarfness, and shortened life. And Bailey remarks[1] that these results are probably closely associated with the chemical constitution and content of the immature seeds. The organic compounds have not yet reached a state of stability, and they therefore respond quickly to external stimuli when placed in conditions suitable to germination, and there is little food for the nourishment of the plantlet. The consequent weakness of the plantlet results in a loss of vegetable vigor, which is earliness. In other words, if the melon grower wishes to increase the earliness of his crop, he can do so by persistently gathering his seeds from immature fruits, but he will invariably secure earliness at the expense of vigor of plant, and without a vigorous plant the crop of fruit will inevitably be shortened. More than that, a plant that is weak in vitality cannot produce a fruit of the highest quality. It is a recognized fact, therefore, that seeds like the melon and cucumber will produce the greatest yield of the highest quality fruit from well-ripened seeds which are two or three years old.[2]

Early vs. Late Ripening Fruits for Seed.—There is a prevalent opinion that, in order to prevent deterioration in the time of ripening of the melons, it is necessary to select the first ripe fruits for seed.

[1] "Plant Breeding."
[2] A. B. A., Vol. IV, page 165.

In other words, if one waits until toward the close of the season before selecting fruits for seed, the tendency will be for the succeeding crop to be later in ripening, and if this is followed up for a few years, a naturally early variety will be transformed into a late variety. At first thought, one might naturally take it for granted that such would be the case, and yet I have been unable to find any well-authenticated data, coming from actual experiments, on the subject. In reply to an inquiry, Dr. B. D. Halstead, of Rutgers College, New Brunswick, New Jersey, says: "I do not know where to turn for the information you desire. The whole subject is well worthy of prolonged study, as only a long series of generations can give the required data for the deducing of a rule."

The same list of questions was addressed to Prof. P. K. Blinn of Rocky Ford, Colorado, and here is his reply: "In regard to developing early maturity in cantaloupes, I have found in my work, that the individual plant is the unit of variation, and should be the unit of selection; that is, if seed of a number of individual plants from even a relatively pure variety be saved separate and planted in a comparative test under uniform conditions, there are apt to be marked contrasts in time of development as well as many other variations which offer the opportunity for selection of any of the desired traits. The more careful and systematic the breeding or seed selection has been, the less the variations will be and the more uniform the product. As a general proposition, the early selected seed will tend to produce the earlier crop, for the reason that the early selection will obviously include more of the

seed from early maturing plants than the late selections from the same field would have.

"As to the specific question as to whether the early matured seed from a given plant will produce earlier results than late maturing seed from the same plant, I have not found in my work any appreciable difference, except that the early seed is apt to be much plumper and heavier, which will naturally produce a more vigorous, early, better-fed seedling, and, consequently, earlier crops. We have seen this here every year in sacking cantaloupe seed; the ordinary seamless sack will hold eighty to eighty-five pounds, while of the late-saved seed only about seventy or seventy-five pounds can be gotten into a sack, and this difference is mostly in the seed kernel; hence, there is another reason for the superior value of early selected seed."

Effect of Latitude and Altitude on Early Maturity.—In a circular on cantaloupe breeding, Professor Blinn makes the following statement concerning the effect of latitude and altitude on the time of ripening: "It has long been an established fact that early maturity in plants can be hastened by using seed from a higher altitude or more northerly latitude. It is also true that seed grown under dry climate conditions where the moisture is controlled by irrigation is plumper and heavier and superior in vigor and vitality to that produced in humid sections having excessive rainfall." One should not deceive himself, however, by thinking that because the melon was grown in Colorado, or any other state of a similar altitude, it will necessarily produce melons of superior quality.

Many mistakes have been made and disappointments experienced by growers in different parts of the country by planting northern grown seed which was taken from melons indiscriminately from the field without any thought of selection. The law of heredity and environment holds true in Colorado as well as anywhere else. Because a certain strain of seed will produce good results in Colorado, it does not necessarily follow that it will do equally as well in other states and under entirely different conditions. It is only after a long period of selection of seed from melons of the same strain which have been grown under different environments that we can be reasonably certain of success. Says Professor Blinn: "Ten years in cantaloupe breeding has demonstrated that in such heredity tests some will breed uniformly true, a desirable type, while others will be irregular and worthless as seed. If choice specimens are again selected and given another heredity test, the variations will be less marked and the seed will improve along the lines of selection. After a few years of systematic effort, the reproducing tendency of seed so developed can be depended upon, but the system should be continued indefinitely to constantly produce reliable seed."

CHAPTER V

FERTILIZERS FOR MELONS

The kind and quantity of fertilizers needed for melons will depend very largely upon the kind and condition of the land to be planted. If ordinary farm crops, in which clover or some other leguminous crop has a place in the rotation, have been grown on the land for some time, the probability is that the soil will already contain a fair amount, at least, of vegetable matter, which is very essential to the proper growth and development of the members of the vine family, such as melons, cucumbers, pumpkins, and squashes. As a matter of fact, however, we usually find that in most sections of the country where melons are grown extensively, often covering hundreds of acres, the soil is of a sandy nature, often very light sand, which is deficient in vegetable matter.

The quickest and cheapest way to supply this to the soil is by means of clover, cowpeas or soy beans. I am aware that in some sections it is quite difficult to get clover to grow successfully, and in such cases the cowpeas or soy beans will answer just as well. They may be sowed at the rate of one bushel per acre at corn-planting time, in which case they will be ready to turn under in the fall, or they may follow an early crop of peas or sugar corn and be handled exclusively as a cover crop, to be "hogged down" during the fall and winter. After one or two of these crops have been incorporated

with the soil, there will not be any trouble about securing a stand of clover in the regular rotation.

It must be borne in mind, however, that, like everything else, this may be overdone and the soil become so rich in vegetable matter that the vines will produce a fruit that is overgrown; too large for the variety, and of poor quality, as well as being later in ripening. We must remember that there are two contending forces at work in a plant; viz., the vegetative and the reproductive. In some the vegetative is most prominent, while in others the reproductive character seems to be strongest.

Melon plants that have a tendency to produce a large amount of vine and foliage are usually low in their fruit-producing capacity, and vice versa. This, however, may be remedied to a great extent, by careful attention to the kinds and amounts of fertilizers used. If the tendency is to produce too much growth of vine at the expense of fruit, then the nitrogenous elements in the fertilizer should be reduced and more of the fruit-producing elements added. On the other hand, if the plant is weak in vegetation, it should be stimulated by adding more of the nitrogenous compounds. The successful commercial melon grower, therefore, will see to it that his soil is in first-class condition, not only to enable it to produce a large crop of fine-looking melons, but melons of the highest quality. This will require a balancing up of the elements of plant food, but the best way to do it will have to be studied by each individual grower. (See Fig. 6.)

In his book on fertilizers,[1] Voorhees makes the following statements concerning the needs of these

[1] "Fertilizers," Voorhees.

Fig. 6. A bunch of well-grown Rattlesnakes.

crops now under discussion: "All of these crops seem to require an abundance of vegetable matter in the soil in order to make their first growth Hence, upon soils deficient in this respect, manures should be applied which are rich in vegetable matter. Composts in the hill have proved of special advantage, as they seem to encourage an immediate feeding and prevent delay in early growth. In the best growth of the plants it is also necessary that the mineral elements shall be available and that the nitrogen shall be of such character as to encourage a continuous, rather than a quick growth of vine; that is, unless the quickening nitrates are applied frequently, they are less desirable than organic forms of nitrogen. Hence, with the usual broadcast application of the basic mixture at the time of planting, together with a compost in the hill, further application of organic nitrogen should be made, its character to be such as to promise a relatively rapid change into nitrate. The basic mixture may be reinforced by any one of the following materials: 200 to 300 pounds per acre of cottonseed meal, 100 to 200 pounds per acre of dried blood, or 300 to 400 pounds of fine ground tankage. Any organic substance whose greater part will decay in one season will generally give better results than the nitrate, unless the latter is applied in frequent small top-dressings, because organic forms of nitrogen provide for a continuous growth of vine and fruit, while too great an abundance of immediately available nitrogen as nitrate is liable to cause too rapid and large growth of fruit of poor quality."

It is a common practice in the middle West to plow the land quite deeply—eight or nine inches—as early

as it can be worked, using a jointer on the plow in order to make sure that all the vegetation is turned under The soil is then worked over several times in order to get it thoroughly pulverized and compact. As the time for planting approaches, the land is thoroughly harrowed and then marked off with either a breaking plow or an ordinary single shovel plow, 10 by 10, 9 by 9, or 8 by 10 feet for watermelons, and about 5 by 5 or 5 by 6 feet for muskmelons. A shovelful of well-rotted stable manure is then placed at each intersection of the furrows where the hills are to be and well worked into the soil. This gives the young plants an early and vigorous start, and if the balance of the soil is in fairly good condition, from plowing under clover and other cover crops, they are able to maintain a good growth throughout the season. Where stable manure cannot be obtained, a mixture of commercial fertilizer, similar to the formula given by Voorhees is used, thoroughly mixed with the soil before planting.

CHAPTER VI

STARTING THE PLANTS

Planting in the Open Ground.—In the more southern portion of the country, where the season is long and there is very little danger from frost, the common practice is to plant the seeds in the open ground where the plants are to grow. This, of course, is a great advantage where it can be done without endangering the crop by frost, as it saves a large expense of handling and transferring the plants. The melon does not take kindly to having its roots disturbed; hence, great care is necessary in transferring them from the seed bed to the field. Southern growers, therefore, usually practice the simplest and cheapest methods of getting the crop started.

But even in the South, the commercial melon growers wish to get their crops on to the market as early as possible in order to catch the highest prices; so it often happens that the ground is made ready and the seed planted before the season has become very far advanced; and if cold weather threatens, all that is necessary is to cover the hills with some kind of litter until the soil and air are warm enough to insure safety. This method applies more especially to the muskmelon than to the watermelon. As the melon is not a deep feeder, but rather spreads out its root system near the surface, following after the manner of growth common to the vine above ground, it is not considered necessary

by the southern grower, at least, to plow his land very deeply before planting, as this would in a measure disturb the ordinary habit of the plant, causing it to root deeper and to produce a heavier crop of vines at the expense of fruit. He would rather put on the surface the extra labor required in deep plowing, thoroughly pulverizing and mixing the surface soil with the harrow; then, when the seeds are planted, they germinate quickly and the young plants start off quickly and vigorously and produce ripe fruit earlier than they would on a deeper soil.

The same method is employed quite largely by the more northern growers, especially those in the middle West or Mississippi valley; but as we go farther north, the land is plowed deeper, some of the most successful growers plowing as deep as eight inches. Their object is to secure a warm seed bed to a greater depth than could be had by shallow plowing. As soon as the weather is warm enough, the land is gone over with the harrow and thoroughly stirred so as to destroy any weeds which may have started. It is then marked off in furrows, as indicated in Chapter V, the manure is applied, the hills are made about level with the surface and the seed is covered about an inch deep if the soil is moist; if not, it is covered a little deeper. If the soil has been made very fine and the subsoil is such as to retain moisture, capillary attraction will bring the proper amount of moisture up to where the seeds can make use of it, even if the surface is quite dry. The old method of mounding up the soil for the hills, so as to secure a greater degree of heat, is now about obsolete.

Plant Plenty of Seeds.—Growers usually like to

use plenty of seeds so as to insure a good stand. The cost of seed is a small item when compared with the loss in time in replanting and the consequent unevenness in the time of ripening of the crop. The number of seeds used will depend somewhat upon the results obtained from the tests for germination which have been made previously, but, generally speaking, from two to four times as many seeds are planted as are expected to remain for the crop. Then, after the plants are well up, the weaker ones are thinned out, so that not more than two or three plants remain. It will require from two to three pounds of muskmelon and four to five pounds of watermelon seed to an acre.

Starting in Hotbeds.—Our more northern growers, especially those in the upper Mississippi valley, use the hotbed and cold frame very generally for starting the muskmelon, and some use them for starting the watermelons as well, although the latter are generally planted in the open ground. This enables them to gain from one to two weeks in time of ripening. "These beds (Fig. 7) are substantially built of 2 x 8 planking and are 9 feet wide and from 25 to 40 feet long, many of them holding from 2,000 to 3,000 plants, or enough to plant nearly two acres. A single grower sometimes has a range of 30 to 40 of these beds, enabling him to set from 50 to 75 acres of cantaloupes. The beds are usually placed in a warm and sheltered location so as to get the benefit of the early spring sun. The seed is started in this latitude during the last week in March or the first week in April in small veneer boxes. These are about 5 inches square, and are similar to berry boxes, except the bottoms are flush

instead of being recessed. These are placed side by side in the bottom of the hotbed and are filled with finely prepared earth or compost. Great care is taken with the material for the seed bed, and it is frequently worked over before being used. The soil is made firm and allowed to come slightly above the tops of the boxes in the hotbed. It is then marked out in squares in such a way that the intersection of the marks center the boxes, and the seeds are planted therein. After putting in the seeds,

Fig. 7. Hotbeds where the melon seeds are started.

careful attention is given to watering, to ventilating and to keeping out weeds. A day temperature is maintained at first of from 50 to 60 degrees. As the time for transplanting draws near, more air is given in order to harden off the young plants. The seedlings are moved about in the beds to fill any possible vacancies and by the time they are ready to transplant a perfect stand has been secured.[1]"

These plant boxes are very cheap and may be had from almost any berry box manufacturer. They come "knocked down" the same as do the quart or pint berry boxes and may be made up by the

[1] Bulletin 123, Purdue Experiment Station.

grower. In case, however, one needs only a comparatively few hills for home use, the seeds may be planted upon pieces of inverted sod. A tough blue grass sod is cut about two inches deep and is then cut into squares of about four inches each way. These are placed bottom up in flats and about three seeds are placed in the center of each piece. The flats are then put into the hotbed and the seeds covered with fine soil and kept well watered. Many of the small commercial growers practice this method of starting seeds.

Fig. 8. This is easier than watering by hand.

"Several methods for watering are in successful use. A common method is to mount a tank on trucks and drive along the hotbeds watering through a lead of hose provided with a rosette nozzle. (See Fig. 8.) Some growers whose beds are near their windmills have pipe lines laid among their beds with hydrants conveniently located for watering with the hose, the pressure being supplied by a tank in the windmill tower." Whatever method of watering is employed, enough water

should be used to moisten the entire mass of soil instead of simply wetting the surface. One should remember that it is the roots that need the moisture, and not the tops so much. A good watering once in two or three days is far better than a slight sprinkle every day.

Starting in Hothouses.—Where one is fortunate enough to have a hothouse or greenhouse, the plants may be started in this and the hotbeds may be dispensed with. But owing to the much greater expense in constructing and heating a hothouse, it would not be advisable to do so for melons alone; but where one already has a house which is used for other forcing crops, such as lettuce, tomatoes, and the like, it will be found to be very useful for starting the melon plants, as the lettuce and tomatoes will be well towards the close of their season before much of the room will be needed for the melons. In this case, there will doubtless be plenty of four-inch pots which can be utilized for starting the melons instead of the plant boxes. The hothouse has one advantage over the hotbed for this purpose in that the temperature and watering can be kept under better control than is possible in a hotbed. As the season approaches for planting out-of-doors, all of the windows and ventilating sashes should be left open night and day in order to harden off the plants and accustom them to outdoor temperature.

CHAPTER VII

CULTURAL METHODS

Transplanting.—If the plants have been properly cared for in the hotbed so that they have made a good, vigorous growth and have been well hardened off, they should be ready to go into the field in about four weeks from the time of planting. The plants will then have reached that stage of development when it would be unsafe to keep them confined longer in their narrow quarters. The transplanting season is a very busy time with the commercial melon grower. A large force of men is required in order to get the work done as quickly as possible and to insure uniformity in the growth of the plants.

The field has already been prepared, as indicated in the previous chapter, by furrowing out both ways or by furrowing one way and simply marking the other so that the hills will be the required distance apart, which will vary, according to the notions of the grower, from 4x4 to 5x7 feet apart for muskmelons, and 8x10 to 10x10 feet for watermelons. Four by four feet, however, is too close for either. This does not give room enough for the plants to develop properly; and, more than that, it is practically impossible for one to spray and otherwise care for the plants or to harvest the crop without greatly injuring the vines. A common distance, therefore, is about 4x6 or 5x7 feet for muskmelons. The fol-

lowing table shows the number of plants required to plant an acre at different distances apart:

Plants Required for an Acre

4	x	4	feet	equals	2,722	hills
4	x	5	"	"	2,178	"
4½	x	6½	"	"	1,500	"
5	x	5	"	"	1,742	"
5	x	7	"	"	1,250	"
6	x	6	"	"	1,210	"
8	x	8	"	"	680	"
9	x	9	"	"	537	"
10	x	10	"	"	435	"
11	x	11	"	"	360	"
12	x	12	"	"	302	"

When ready to be taken to the field, the plants should be thoroughly watered, so that they can be handled without disturbing the soil about the roots. In the large melon districts, large flat-topped wagons are provided for hauling the plants to the field. (See Fig. 9.) The boxes are set off at the intersections, and a gang of boys take them and, with a stout pocket knife, slit the corners so that the box easily drops off, leaving the soil and plants intact. They are then placed in the hills and a second gang of men follows up and draws the soil up around the cube of earth which holds the plants. Some do this work with hoes, while others go on their knees and simply use their hands, as the sand is very easily handled. By this method the roots are not disturbed and the plants continue to grow without any check.

Horse cultivation should now begin and continue almost constantly for the first two or three weeks, especially if the season is dry, so as to conserve the moisture and keep the plants growing. After every rain, the cultivator should be started as soon as possible in order to prevent any crust from forming and a consequent loss of moisture. Keep this up as long as the horse and cultivator can get

Fig. 9. Hauling the plants to the field for transplanting.

through without injuring the vines. Some growers prefer to plow deep while the plants are small in order to prepare the soil for the young feeding roots which will soon make their appearance, following this with shallow cultivation until the vines cover the ground. With such treatment but little hand hoeing is needed. But different conditions call for different treatment, and so the resourceful grower

will exercise his ingenuity in trying to meet those conditions. There are sections in the melon growing regions where the soil is a very light sand and the country generally level, where the melon vines are sometimes injured to a considerable extent by being blown around by the wind and the conditions have to be met.

Here is the way one of our very successful growers meets this obstacle. He says:[1] "I plant our watermelons 9 by 12 feet apart, and immediately after the third plowing I plant a catch crop, as I call it, and for this I prefer to use navy beans. Following the row in which the hills are 12 feet apart, I plant a hill of beans 4 feet on each side of the melon hill. They will come up just in time for a thorough plowing, following the rows in which the hills are 9 feet apart, plowing a row of melons and then a row of beans, and so on. This gives clean ground for the vines to run on and mellow beds for the feeders to run through. The vines are now reaching for something to catch hold of to keep the wind from tossing them about, and they will soon find the bean hill; or, if they do not, they should be laid in that direction, when they will anchor to it, and the plowing from this time on must be in only one direction."

"I now discard my shovels, take a one-horse plow, and get a set of sweeps 12 inches wide for cantaloupes and one 12 inches wide for the center, and one 18 inches on each side for watermelons. The plow has a depth regulator enabling me to run the sweeps about one inch deep. The outside sweep will run partly under the vines and shove them to

[1] Indiana Horticultural Report for 1909.

their place As soon as the vines meet, I cut off the ends. I keep the sweeps running, bearing away from the row a little each time. The side vines will soon confine the plowing to once in the row. In this way, I am enabled to plow watermelons when they are getting ripe.

"You will observe that I am not interfering with the feeders, as they are running through the ground as fast as the vine is spreading above it, but I am furnishing a dust mulch to retain moisture, which is usually very essential at this time of the year. I also avoid the expensive labor of laying the vines for the last plowing, which most growers do, which usually causes all of the little melons to fall off and checks the growth of the vines for a few days and, if it is dry, will permanently injure them. If the beans are ripe, they may be gathered, as they have served their purpose."

By this method of cultivation, this man has raised four carloads of Monte Cristo watermelons from six acres, besides saving 500 pounds of seed.

CHAPTER VIII

HARVESTING AND MARKETING MELONS

The time is fast approaching when the city buyers—and they are the ones upon whom the large commercial grower depends very largely for his profits—will demand a better quality in the melons they buy than they have been getting in the past; and the grower who has so developed the fineness of flavor in his melons, as well as other good qualities, by selection and breeding, as to establish a reputation for furnishing a high-class melon to his customers, is the one who is going to capture the best markets in the land.

It is a notable fact that our melon growers have not given enough attention to this side of the business. Most of their efforts seem to have been expended in developing types or strains which suited their particular fancy or perhaps which their markets demanded, without giving any particular thought to the development of quality. Types and strains are good so far as they go, but would it not be possible for one to so improve the fineness of flavor at the same time that the average buyer would in time be able to associate a certain quality or flavor with a certain grower's type or strain? I am confident that the plant breeder of the future will be able to do this. In fact, there are a few men who have already made rapid strides in this direction, and, unless I am greatly mistaken, the next

decade will witness still greater progress along this line. (See Fig. 10.)

The large commercial grower of to-day, who must ship his melons long distances, has but one thing in mind—that is, to get his melons into the market in good condition at the earliest possible moment. As a result, the early shipments are usually picked before they are ripe. Now, we all know that the melon, like most of our tree fruits,

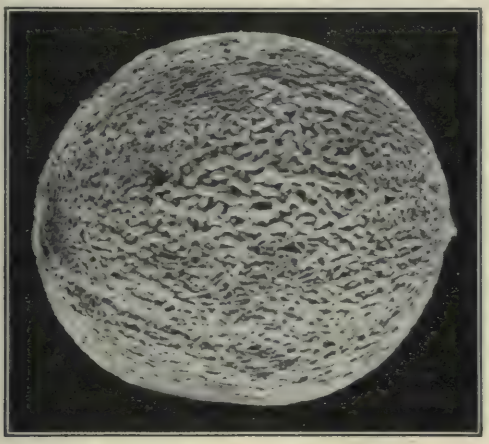


Fig. 10. A thoroughbred Rocky Ford.

will develop a better flavor if left on the plant until ripe, but every melon shipper knows that he cannot do that if he expects to ship any great distance. They would be certain to decay before reaching their destination, consequently they must be picked before they are ripe. But how long before—that is the question. The rule which holds good in picking winter apples will apply very well here; viz., the

fruits should be mature, but not ripe. A fruit is mature when it has completed its growth; it is ripe when it is ready to eat. The melon should be mature when it is picked; then it will usually be ripe when it reaches the market, although this will be governed largely by the distance they have to travel and temperature to which they are subjected while en route.

Cantaloupes are generally shipped in refrigerator cars when going long distances, and so they could be left on the vines longer than many of them are, and consequently would develop a much better flavor than they now have. With our present transportation facilities, it is not an easy matter to be able to distinguish the right time for picking this fruit for shipping long distances. The expert can do it, and he does it in much the same way that the apple grower tells when to pick his winter apples—by their general appearance, or when the watermelon gives out just the right sound when thumped. But the amateur cannot do this, and so he must resort to Nature's method of picking—when the stem will separate readily from the melon.

I think that most consumers will agree that the general tendency is for the southern grower, especially, to pick his melons too early. This is especially true of cantaloupes. The temptation to get his melons on to the market before his competitors, is too great for most growers to withstand, and as a result we find that there is much complaint about the poor quality of the early melons. The only justification offered for doing this is the higher prices that these early shipments bring in the northern markets. And this criticism is not confined en-

tirely to the southern grower either. Human nature is pretty much the same everywhere, but the more northern grower finds his early markets pretty well occupied with melons from more southern districts, so the temptation is not so great in his case; but even here we often find him picking and shipping before the melons are ready in order that he may get a few cents extra in price. All this, of course, has a tendency to depress the market price instead of stimulating it, just as filling the middle of the

Fig. 11. Harvesting cantaloupes and hauling them to market.

barrel with small inferior apples tends to demoralize the markets; because, when the buyer tries to eat an unripe melon, he naturally becomes skeptical concerning the whole melon business, and turns his attention to some other kind of fruit with which he is more familiar. As a result of this short-sightedness on the part of growers, not one-half as many melons are consumed in our large cities as there would be if the grower would give more attention to getting them on to the market at the time

Fig. 12. A typical packing shed.

when they will show the best quality, even at the sacrifice of a few days in time.

What the great majority of our people want is a good melon, and if the first shipments to reach them have that good quality, that very fact will go a long ways towards selling future shipments at good prices. How often do we hear the northern housewife say, after the first few attempts at having melons on the breakfast table, "Why is it that the shipped-in melons are so much poorer in quality than are those that are home grown?" The answer is easy. In the first case they were picked while green; and in the second they were allowed to ripen up on the vines. Then, too, if our growers would give more attention to the care of the melons after they are picked and until they are loaded into the car, there would not be so much danger of decay before they reach the consumer. For example, if one is so situated as to be able to have a cool building in which to store the melons until they are thoroughly cooled off, instead of simply a shed open on three sides which may furnish a partial shade but very little protection from the heat, he would be able to allow the melons to remain on the vines for a longer time and still get them into the market in a better condition than it is possible for him to do under the present system.

But it may not be possible for every grower to have a cool storage building, but it is possible for him to improve on present methods. The up-to-date apple grower wishes to get his apples into a cool place, at least in the shade, just as quickly as possible after they are picked in order that they may hold up longer. Melons need shade for the same

reason. In fact, they should not be subjected to the direct rays of the sun after they are taken from the vines if they are to be shipped long distances. They should be covered while on their way from the field to the packing shed and kept in the shade until loaded for shipment. Instead of this, a common method employed, in harvesting cantaloupes especially, is for the pickers to go over the fields with baskets, picking those which, in their opinion, are ripe enough for shipping (See Fig. 11.) They are then placed in crates at the ends of rows or along a driveway, where they remain in the hot sun until they are gathered up and loaded on to flat wagon beds and hauled to the packing shed, which often consists of a roof supported by posts, and which is large enough to hold several loads of melons and still leave room for making and storing crates. (See Fig. 12.)

Packing As It Is Usually Done.—As the melons come from the field, they are loaded on to an incline table, the size of which will depend upon the size of the crop to be harvested, but it will usually hold several wagonloads. The packers stand at the lower side of this incline, and as the melons are unloaded they are carefully sorted and graded into sizes according to the style of package to be used. This work is done very rapidly by those who are accustomed to it, an expert very rarely picking up a melon the second time. His eye becomes so trained that a glance is all that is necessary to satisfy him as to the proper place for each particular melon. Each crate or basket holds the same number of melons of any given grade, and they are all as nearly the same size as it is possible to get them.

Style of Package.—The style of package will depend very largely upon the requirements of the markets to which they are going and the kind of melon which is being packed. Fig. 13 shows some packages in common use. The half-bushel climax basket is used quite largely by growers in the middle West for the Netted Gem type. This holds 16 melons of the Rocky Ford or Netted Gem, packed in two layers and two deep. It requires experience for a man to be able to pack these baskets properly and rapidly, as the bottom layer requires a slightly smaller melon than does the upper, and yet they must all fit in closely when the basket is filled so there will be no moving and consequent bruising as the baskets are handled. These baskets are very easily packed into the car, so that very little room is wasted. The smaller varieties, such as the Emerald Gem, are often packed in smaller baskets. This is especially true of the early shipments.

It sometimes happens that, during a peculiarly favorable season for growth, the Rocky Ford type will become too large for the Climax basket, and so what is known as the Pony crate has come into use in some parts of the country. This will hold 12 melons of the larger size, and so takes care of those which could not be packed to advantage in the Climax baskets. In portions of the middle West, this crate has come into quite general use, as it is easily handled and packs well in the car. Other sections of the country demand a larger-sized crate, and some growers pack in barrels. This is especially true where the larger varieties like Tip Top, Montreal and Hackensack are grown. Many think, however, that these varieties are too large

and bulky for crating to advantage, costing too much for crate material, and as they will hold up very well when shipped loose in the car, many growers make a practice of crating only those of extra quality which are intended for the fancy trade. In fact, the same principle that is practiced by the up-to-date fruit grower will apply here. He finds

Fig. 13. Some different styles of packages.

that it will not pay him to use boxes for anything except it be a first-class article in every respect; the expense is too great; and so the medium grades of apples, for example, are packed in barrels or, in many instances, they are shipped in bulk, and the net returns are often nearly as great. So it is with melons.

Owing to the increased cost of basket and crate material, it will not pay to crate anything but first-class melons. All others should be shipped in bulk or in barrels, or sold at home for what they will bring. As fast as the baskets or crates are filled, they should be stamped with the name and grade of melon and also the name or initial and address of the grower. For example, Netted Gem, Select, Thomas Henry, or T. H., Rocky Ford, Col. This shows at once that the grower has faith in his melons, and that he is not afraid to let the consumer know where they came from. It also enables the consumer to come back for more of the same kind if he finds them up to the standard of excellence.

A grower who cares anything for his reputation cannot afford to place his name on anything but a first-class article. (See Fig. 14.) As soon as the crates are ready, they should be taken directly to the refrigerator cars and packed in as closely as possible, so as to prevent any shaking about while in transit. Ordinary cars will hold from 1,200 to 1,400 Climax baskets, which would make from 20,000 to 22,000 melons to the car of the Rocky Ford or Netted Gem type.

Watermelons are nearly always shipped in bulk, loose in the car, and as about three times as many acres are devoted to the growing of watermelons in the United States as are given to cantaloupes, it will be readily seen that the melon business assumes large proportions in the commercial life of this country and makes large demands upon the transportation facilities. In some of the prominent melon-growing states, the yield of watermelons per

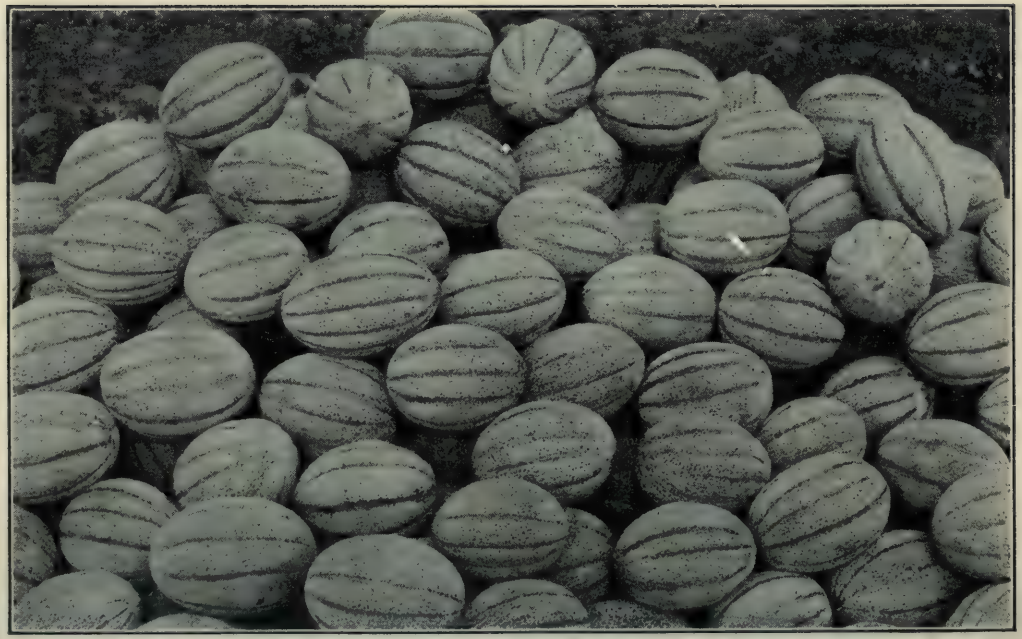


Fig. 14. A fine bunch of Burrel Gems; note the uniformity of size, shape and netting.

acre is given at from 800 to 1,200 marketable melons. This will depend very much upon the season, whether favorable or unfavorable, and also upon the soil, the kind and quantity of fertilizers used, as well as the care and cultivation given the plants. The net income depends not only upon the above considerations, but also upon the distance from market and the shipping facilities furnished by the railroads. For example, one of the southern states reports a larger yield per acre than does New Jersey, but the net income per acre is very much less, owing, doubtless, to the fact that the New Jersey growers are located close to one of the best markets in the country, and so are able to place their melons on the market at a comparatively small expense. A grower in the middle West says that a good acre of watermelons will produce about 800 salable melons. It will require 1,200 to fill an average car, and the price will average about $80 per carload. This is about 6½ cents each, which would give $52 per acre. Deducting $15 for rent and labor, would leave a net profit over all expenses of $37. The same grower gives $56 per acre as the net income from cantaloupes during favorable seasons. Another grower says a carload of watermelons per acre can be easily produced with good care, which will bring from $70 to $90 per car, while under just ordinary care one-half that amount is all that can be expected. Occasionally $100 to $150 per acre is realized, but not often. So much depends upon the care exercised by the shipper in getting the crop properly distributed so as to avoid losses by glutting the market.

Marketing.—Several methods are practiced by

growers in disposing of their crops, each of which, doubtless, has its advantages, depending upon conditions. Some ship direct to commission houses, taking all the risk of fluctuations in the market themselves. Others sell direct to a regular buyer after the melons are loaded on to the cars. In sections where melon growing assumes large proportions, as it does in certain parts of the country, where hundreds of acres are grown within a radius of a very few miles, it is quite common for the large commission houses to send their agents or representatives into the melon fields for the purpose of buying as many carloads as they may need to supply their trade.

These agents usually "camp on the field," where they can have a general knowledge of what is going on in the way of picking and packing and be able to take advantage of any unusual conditions which may arise. This method also helps the grower, because he is kept constantly in touch with the latest markets; and then, too, where several buyers are in the field there is always more or less competition, which has a tendency to keep prices up to a normal level. Then, too, when the car is loaded and ready for shipment, he receives his check, and so all worry concerning a glut in the market or, possibly, unfair treatment by his commission merchant, is avoided.

In some sections the growers have formed themselves into organizations similar to the large fruit associations of the Northwest for the purpose of securing certain advantages in the marketing of their products, as well as in the purchasing of supplies. In this case, the melons are all marketed

through the association, and the supplies are bought in the same way at wholesale prices.

The Extent of the Melon Business.—Few people realize the extent of the melon business in the United States as it is carried on today. The Thirteenth Census statistics, 1910, relating to truck and market gardening crops are not available at this writing, hence it is impossible to give the exact acreage and yields of melons in the United States for the past year, but according to the census of 1900, the acreage of muskmelons amounted to 60,854, and that of watermelons was 199,849, making a total acreage of 260,703. It is safe to say that the total acreage has increased at least 10 per cent during the last decade, which would make the total area at present cultivated in melons in the United States 286,773 acres.

The average yield of muskmelons ten years ago was 2,350 per acre, and that of watermelons was 954. Assuming that the average yield has not decreased any in the meantime, the crop of 1910 would be about as follows:

Muskmelons	157,500,000
Watermelons	209,500,000
Total	367,000,000

This will give, according to the following table, 8,000 carloads of muskmelons and 200,000 carloads of watermelons as one season's crop in the United States, allowing 1,200 Climax baskets for an ordinary carload of muskmelons.

TABLE SHOWING THE NUMBER OF WATERMELONS REQUIRED TO LOAD A CAR OF DIFFERENT LENGTHS

[1]Car 34 feet long loaded 4 deep contains:

800	melons	averaging	about	35 lbs.
850	"	"	"	32 "
900	"	"	"	30 "
950	"	"	"	28 "
1,000	"	"	"	27 "
1,050	"	"	"	26 "
1,100	"	"	"	25 "
1,150	"	"	"	24 "
1,200	"	"	"	23 "
1,250	"	"	"	22 "
1,300	"	"	"	21 "
1,350	"	"	"	20 "
1,400	"	"	"	19 "
1,450	"	"	"	18 "
1,500	"	"	"	17 "

Car 36 feet long loaded 4 deep contains:

850	melons	averaging	about	35 lbs.
900	"	"	"	32 "
950	"	"	"	30 "
1,005	"	"	"	28 "
1,060	"	"	"	27 "
1,110	"	"	"	26 "
1,165	"	"	"	25 "
1,220	"	"	"	24 "
1,275	"	"	"	23 "
1,330	"	"	"	22 "
1,380	"	"	"	21 "
1,440	"	"	"	20 "
1,485	"	"	"	19 "
1,530	"	"	"	18 "
1,610	"	"	"	17 "
1,700	"	"	"	16 "

[1] Bulletin No. 123, Indiana Experiment Station.

CHAPTER IX

FORCING MELONS

Forcing melons is a highly specialized branch of the melon business which is seldom practiced in this country, except by the rich, or near large cities where there is demand for unseasonable fruits and vegetables, which, of course, implies that there are people who are able and willing to pay the price. The expense involved in the proper equipment and care of the house and the necessity for great care in looking after all the details concerning the requirements of these crops, is much greater than is necessary for outdoor culture; hence, the prices that must be received for the fruit must be correspondingly high, and this limits the market to comparatively few buyers. And yet there is a field for this kind of work, just as there is a field for the forcing of tomatoes, cucumbers, and lettuce, which may also be classed as winter luxuries.

The writer has had some experience in forcing melons, and from that experience he is able to give the following advice to anyone contemplating going into the forcing business. In the first place, it requires capital to build greenhouses and to keep them in repair; hence, one should have some money to start with. It also requires much experience in the management of greenhouses, and so one should not attempt it on his own account until he has served an apprenticeship in the business, and then only in a small way at first. It requires a good

home market for the melons in order to avoid losses in shipment, commission charges, etc. Winter-grown melons must be regarded as a fancy product, grown only for a fancy market and selling for a fancy price. It requires a knowledge of the requirements of these special crops; so much depends upon the proper kind of soil, the amount and frequency of watering, and how applied, the proper temperature both day and night, also ventilation and the ability of the grower to cope with the different insects and diseases which are commonly met with. The striped cucumber beetle out-of-doors is not in the same class with the Red Spider indoors after it once gets a good start.

To be more specific, then, as to requirements, I quote from Bailey:[1] "High temperature from the start (80° to 85° at midday, and 65° to 70° at night); the plants must never be checked, even from the moment the seeds germinate, either by insects, fungi, low temperature, or delay in 'handling;' dryness at time of ripening; a soil containing plenty of mineral elements, particularly, of course, potash and phosphoric acid; polliniferous varieties; the selection of varieties adapted to the purpose."

If one can furnish all of these requirements, he may succeed in forcing muskmelons. Watermelons are seldom, if ever, grown in forcing houses.

The Forcing House.—The house may be of any length which can be properly heated, depending upon the number of plants which it is desired to raise. A house that is suitable for tomatoes or cucumbers is good for melons. There should be plenty of space between the benches and glass for train-

[1] "The Forcing Book."

ing up the vines similar to the method of training the cucumber. If an even span, the house should stand north and south, so that both sides may be equally exposed to the sunlight. If three-quarters span, it should stand east and west; the melon requires plenty of sunlight. The heating system should be of sufficient capacity to maintain a high and steady temperature during the coldest weather, and the pipes must be placed under the benches, so as to furnish bottom heat.

The Soil.—A good melon soil must be made. This is done by taking an old blue grass sod, or something similar, cut two or three inches thick, and piling this up with alternate layers of cow manure, until the pile is six or eight feet high. This is left for a year or more to rot, in the meantime forking it over once or twice, so as to get it as uniform as possible. This makes a good, rich, friable soil that will not need much more fertilizer to produce a good crop.

Our experience has shown that subirrigation is much better for either melons or cucumbers than surface watering. So before putting the soil into the beds, the bottom of the beds are covered with soft bricks which have had the lower edges chipped off, so as to admit a circulation of water. These are placed as closely together as possible, and the bed is then filled with soil. Opening should be left at frequent intervals for the admission of water. This will admit plenty of moisture to the roots and prevent them from drying out, which is a very important point to remember in the forcing of melons. The soil should not be more than five or six inches deep.

Planting the Seeds.—The seeds may be planted

in four-inch pots and then transplanted into the soil later on, placing the plants about 2½ feet apart. More seeds should be planted than are wanted to remain, in order to guard against accidents—thinning out the weaker ones later on, leaving only one in a hill. If the crop is wanted for the Christmas holidays, the seeds should be planted about the first of September; and for early spring, plant about the first to the middle of November.

Training.—As soon as the plants have gotten a good start in the bench, the terminal bud is nipped out, so as to cause it to throw out laterals; two or three is enough. These are then trained up to a wire or cord, and as soon as they reach the top, they are cut back. This will induce them to produce fruitbuds.

Fertilizing the Blossoms.—This is done by hand, as the male and female flowers are borne on different parts of the plant and there are no bees or other insects, and scarcely any wind to aid in the process of pollination. Hand pollination is done very rapidly by means of a piece of clean glass and camel's-hair brush, as explained on page 6. One should not be in a hurry to fertilize the blossoms until there are a number ready, so that the fruits on the same plant may ripen up together. We should remember that the most exhaustive process on the plant is the ripening of the seeds, hence if one melon is allowed to ripen long before the others, the later ones are likely to be checked in their growth and consequently will be of poor quality. Four or five melons to the vine are all it can ripen up properly, and some varieties will not carry more than two or three.

Market.—As indicated above, the demand for winter melons will always be limited to a few rich people who are willing to pay almost any price for these luxuries. The grower should get from $1 to $1.50 each for the crop in order to pay expenses. If he is growing them on a large scale in connection with cucumbers and tomatoes where the same heating plant will do for all, he could probably afford to sell them for a little less. But in any case he should make his own market, and then endeavor to supply it with the best quality that can be produced. If he does that, the price will take care of itself.

Varieties.—Following are some of the varieties which may be grown in frames or greenhouses with good results: Blenheim Orange, Lord Beaconsfield, Royal Favorite, Red-fleshed Prescott, Delight of the Table, Trevoux, Noir des Carnes, Tours Sugar, Turner's Seedling, A1 Superb, Best of All, Diamond Jubilee, Invincible Scarlet, Hero of Lockinge, Frogmore's Scarlet, Ne Plus Ultra. The Emerald Gem is about the only one of our outdoor varieties which can be forced to advantage. This, with Blenheim Orange, Hero of Lockinge, Frogmore's Scarlet and Turner's Seedling, have given the best satisfaction; but, like the outdoor varieties, they will all do well when given just the proper care.

Insects.—There are but few species of insects which are troublesome to the melon plants in the greenhouse, but these few are enough to keep the grower busy if he would prevent injury to his vines and a consequent shortening of his crop.

Red Spider *(Tetranychus bimaculatus)* is one of the most troublesome species to be met with. This

is one of the mites, consequently is very small and seldom noticed by the novice until his plants begin to show signs of trouble. About the only thing to be done for them is to keep the plants growing vigorously and maintain a moist atmosphere in the houses at all times, until the fruits begin to mature. This will have a tendency to keep them down, as the mite thrives only in a dry atmosphere. One should not wait, therefore, until the mite appears but strive to prevent its getting a foothold if possible, by frequent sprayings.

White Fly *(Aleyrodes vaporariorum).*—This little fly belongs to the sucking class of insects, and is often found in greenhouses both north and south, but it is more commonly found farther south. It somewhat resembles the aphis or plant lice, except it is covered by a white, powdery substance which makes it easily visible upon the green leaves. This may be easily reached by contact poisons such as kerosene emulsion or a solution of whale-oil soap.

Aphis, sp.—Forcing melons are not exempt from the attacks of the green aphis, and these too, should be attacked as soon as they make their appearance, or even before. The same remedies that are recommended for the whitefly will prove effective for these. Frequent fumigation with tobacco stems will also destroy the lice as well as the fly.

Mealy Bugs *(Dactylopius* sps.).—The mealy bug is so called from the fact that it is covered with a white powdery or waxy secretion. This material serves as a protection from the milder forms of insecticides; but by constantly spraying the plants with water, using considerable force, they may be held in check. A tobacco decoction, using one

pound to one gallon of water, will often prove effective, as will kerosene emulsion, 1 to 15. While the plants are young, the bugs may be picked off without much trouble.

There are one or two fungous diseases which sometimes attack greenhouse melons; one, a powdery mildew, which attacks the upper surface of the leaves; the other is a canker, or "damping-off" fungus, which attacks the plants at or near the surface of the soil. The latter is aided by a continued warm temperature and much moisture on the surface during the early stages of growth. If the roots are allowed to get dry, thus checking the growth of the plant, the disease will be more apt to show itself, and the plants will rot off at the surface of the soil.

Subirrigation is one of the best preventives, as then the surface may be kept comparatively dry. Putting dry sand around the plants will also help. Burning sulphur in pans or on the steam pipes occasionally will have a tendency to keep down the mildew. We have tried all of these remedies with good results. It must be remembered, however, that in dealing with these diseases "an ounce of prevention is worth several pounds of cure," and so the person engaged in forcing melons must be constantly on the watch for trouble and strive to forestall it if possible.

CHAPTER X

INSECTS AND DISEASES

There is scarcely a vegetable crop grown which is more susceptible to the attacks of insects and diseases than are those plants which belong to the Cucurbitaceæ family, to which belong the melon, cucumber, squash, etc. Some of these pests are common to all, while others confine their attacks, for the most part, to one species.

The plants are attacked at all stages, even the seeds are often attacked before germination by a maggot which eats into them, thus destroying the germ; and by mice and ground squirrels, which devour them. And so from the time the seeds are placed in the ground until the fruit is harvested one is compelled to keep a watchful eye upon them in order to prevent injury from some one or more of the two dozen or more species of insects and diseases which are common to this family.

INSECTS

Among the insects which are common to the melon and cucumber probably none are more universally scattered over the melon-growing region, and, possibly, none are more dreaded by the melon and cucumber growers, than is the

Striped Cucumber Beetle *(Diabrotica vittata,* Fab.).—This little beetle is so generally known that a detailed description of it here is scarcely necessary,

and yet there may be a few people who are not acquainted with it. The adult beetle is about two-fifths of an inch in length, yellow in color, with black head, and black longitudinal stripes on the wings and thorax. The larva is a slender wormlike creature, nearly white, except each end, which is brown. When fully grown it measures about one-third of an inch in length.

The adult beetle hibernates under various kinds of rubbish, such as dead grass, leaves, etc. As soon as warm weather comes it comes forth and feeds upon any or all kinds of cucurbit vines, usually preferring the squash, but does not limit its diet entirely to the cucurbit family. Its omnivorous feeding habits make it possible for it to come forth from its winter quarters some time before the cucurbits are planted and still find suitable plants on which to feed. As soon, however, as the melon or cucumber plants are above ground, the beetles begin to call in their forces and begin a general attack on these plants, and if the grower is not watching for them, they will often destroy a large portion of the plants in a single day or night.

The injury to the plants is done by eating into the stems, usually below the ground, where they hide during the hot portion of the day, and also by eating the leaves, which soon causes them to turn brown and dry up. The eggs are deposited upon the stems just below the surface, and as soon as hatched the young larvæ bore into the main roots, which causes the plants to wilt and die. Thus this insect works upon the plant, as it were, from both ends, or, more properly, both above and below ground. This active stage lasts for about a month,

during which time if nothing is done to prevent it, the plants are usually entirely destroyed.

Remedies.—Many remedies have been recommended and tried with more or less success, none, however, working entirely satisfactorily, except possibly the fencing-out method. In some cases a free use of tobacco dust placed around the stems as soon as the beetles make their appearance acts as a deterrent. Some have advocated soaking corn cobs in kerosene oil and then placing them near the plants, but others say that they have made a pen around the hill with oil-soaked cobs and the beetles would eat the plants and then crawl under the cobs for protection from the sun. Air-slaked lime is sometimes dusted over the plants; this simply serves to drive the beetles to other fields or other portions of the same field. Road dust, land plaster, or ashes serve the same purpose. Applications of london purple, paris green or lead arsenate mixed with bordeaux mixture are used with some degree of success, but applications should be frequent, as new growth is constantly pushing out, and this must be kept covered. The bordeaux mixture is used in this case for the purpose of making the arsenicals stick to the plant, but its greatest use is as a fungicide in protecting the plant from its numerous diseases.

Various kinds of coverings for the plants have been used with more or less success. One of these which has given satisfaction was invented by an Indiana grower, who now uses it to the exclusion of everything else. This he calls a "dome screen." (See Fig. 15.) It is made of common wire screen pressed into a dome shape, about six or seven inches

in diameter at the bottom, and costs from three to four cents apiece. It is first dipped into white paint and then placed over the hill when the seed is planted, and it serves the following purposes: Marking the rows, so that they can be easily seen throughout their entire length, whether the plants are up or not; protecting the seed from the field mice; protecting the plants from the striped beetle; and protecting the plants from hail. It is claimed that they will last for ten years. When the plants

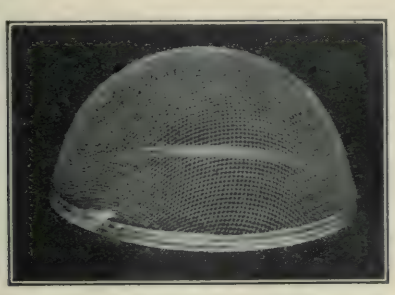


Fig. 15. A handy screen for fencing out the striped beetle.

are large enough to fill all the space, the cups are then taken off, nested together and stored away for the next season.

Early Planting is one of the best protections that can be given, as it enables the plants to get well started before being exposed to the attacks of these insects. Where the plants are started in hotbeds or cold frames, they have already gotten a good start and are practically able to care for themselves when they are put out in the open ground.

Trap Crops are sometimes used to good advantage. This beetle is especially fond of squash plants; and

so scattering hills of these may be planted as early as possible, so that they will have attained a fairly good growth before the beetles make their appearance. After they have accumulated in large numbers on these hills the whole thing may be sprayed with kerosene oil. Occasional plants left in the field until late in the season, after everything else has been cleared away and burned, will give opportunity for the beetles to hibernate under them, when they may be soaked in kerosene and burned. Stimulating the plants to make an early and vigorous growth by the use of commercial fertilizers will often aid the plants in overcoming the insect attacks.

The Twelve-Spotted Cucumber Beetle *(Diabrotica 12-punctata).*—This species is almost as common as its striped relative, and during some seasons it is nearly as troublesome to melons and its allied plants. It is somewhat larger than the other, more oval in shape and instead of striped markings, this one has 12 black spots on the wing covers. This insect feeds in the same way as the other, only it has a somewhat larger variety of food plants, which makes it somewhat less troublesome to the melon. There are two broods in a season, the beetles hibernating in the adult stage.

Remedies.—The same remedies apply here as were recommended for the previous species, but clean culture should be emphasized.

The Melon Aphis *(Aphis Gossypii,* Glov.).—This is perhaps the most difficult melon insect to manage during the seasons which are favorable to its development. It has a great variety of food plants, including many of our common weeds, as well as the

cucurbits, strawberry, cotton, etc. This fact enables it to thrive over a wide range of territory and during almost any and all seasons. Like most of the aphids, however, it has its parasites to contend with, so that it is rarely abundant in all parts of the country every season. Like most of the plant lice, it passes the winter in the egg stage on a variety of plants. These eggs hatch in early spring, and a succession of summer broods is given off until fall, when another crop of eggs is produced. The early broods are capable of getting their food from whatever kind of plant they happen to be on, but as the melon plants come on, winged forms are produced, which enable them to migrate to the melon fields, where they often settle in great numbers and continue to breed as long as the melon plants furnish succulent food. After the melon plants have passed their usefulness, the lice then migrate to other plants.

Like all members of this class of insects, these lice are provided with a sharp beak, through which they take their food in liquid form by inserting it into the tissues of the leaves, thus causing them to curl up and eventually die. This, of course, interferes, more or less, with the complete development of the fruit, so that oftentimes the later fruits are entirely worthless.

Remedies.—First of all, the grower must familiarize himself with the insect and its work before he can do much towards holding it in check. If he is acquainted with plant lice in general, he will have no trouble in identifying this, as in general appearance it resembles the other forms. The first indication of its presence in the melon field will be made

manifest by the curling up of the leaves into a cup-shaped mass. This is caused by the irritation produced by the insertion of the tiny beaks and the sucking of the juices from that side of the leaf. This cup also forms a protection to the insects and makes it very difficult to hit them with any form of spray mixture. Then, too, as the vines grow so close to the ground, and as the lice are on the underside of the leaves, it is necessary to spray from the underside in order to reach them. This may be done in a small way by using kerosene emulsion, with a bent nozzle; but it would be practically useless to attempt this in large fields.

And so the commercial grower is really limited to two methods of procedure: First, clean culture of the entire field, so as to destroy its early and late food plants, as well as to destroy its hibernating quarters; second, he should dig a hole and bury the infested plant just as soon as the lice make their appearance. Nature often does much towards holding these insects in check through the parasitic species which prey upon them in great numbers. In fact, if it were not for these natural parasites, the lice would soon put the melon grower out of business.

Squash Bug *(Anasa tristis,* De G.).—In some sections of the country this is one of the worst pests the melon grower has to contend with. The squash is its favorite food plant, but it also attacks the muskmelon, watermelon, and cucumber. It appears quite early in the season, soon after the melon plants are up, and multiplies quite rapidly. The adult is one-half to three-fourths of an inch long, of a grayish brown color, and belongs to the sucking

class, or true bugs. It often goes by the name of stink bug, on account of the very offensive odor which is given off when disturbed. The eggs are a golden brown color and are laid in clusters on the underside of the leaves, where they soon hatch into little active bugs, differing from the adults in size, color, and in the absence of wings. They suck their food from the leaves, causing them to dry up and die. This, of course, has the same effect upon the plant as does the melon aphis, only the leaves do not curl up as in the latter case.

Remedies.—Like most of the sucking insects, it is very difficult to control, especially if it has gotten a good start before it is discovered. Contact poisons are the only ones recommended in this case. Spraying with kerosene emulsion is often practiced with good results early in the season. In a small way, the old bugs may be picked off and destroyed as soon as they make their appearance, thus preventing many future generations of young bugs. The bright clusters of eggs are quite conspicuous and easily seen on the underside of the leaves. These should be picked off and destroyed. Then, too, the same trap remedy recommended for the striped cucumber beetle will apply here; viz., plant early hills of squashes here and there in the melon field, and when the bugs have collected on them, spray with pure kerosene oil.

The Squash Lady-bird *(Epilachna borealis,* Fab.). —We usually look upon the members of the "lady-bird" or "lady-bug" family as our friends, as the greater number of species are predacious in their feeding habits, living upon other insects of various species, but especially the plant lice, thereby assist-

ing very greatly in holding these pests in check. Occasionally, however, we find an exception to the rule, and so we find the above species feeding upon the melon, cucumber, etc., and often becoming quite injurious, especially in the eastern states along the Atlantic coast. In many parts of the West it is not known as a melon insect. The species belonging to this genus are quite large, of the characteristic hemispherical form, yellowish in color, with black spots.

The larvæ are also yellow and covered with spines. Both adult and larva feed upon the melon leaves by first marking out a circular space, within which it feeds until all of the edible portion has been devoured, when it moves to another position and repeats the process. As the larvæ usually feed on the lower surface of the leaf, they are more difficult to reach with poisonous sprays than are the adults. However, as they chew their food instead of sucking, as does the melon aphis, it is only necessary to place the poison where they will get it during the process of eating. The adult hibernates under various kinds of rubbish; hence, in localities where it is commonly found, it may be destroyed by cleaning up and burning the dead plants and other rubbish. By using the dome screen, which is mentioned under the striped cucumber beetle, the early attacks of this beetle can be avoided.

The Pickle Worm *(Diaphania nitidalis,* Cram.).—The adult of this species is a beautifully colored, brown and yellow moth, sometimes called the "pickle moth," because the larva has a habit of feeding on the cucumber, both vine and fruit. It rarely does much injury in the more northern states, although it is sometimes found as far north as

Michigan and New York. In the southern and western states it often becomes very troublesome both to the pickle and melon grower, especially to the cantaloupe grower. The larvæ first attack the plants by eating holes in the leaves and young stems, later attacking the blossom buds, destroying many young fruits in this way, and then later on attacking the growing fruit by eating holes through the rind, enough to render it worthless, and then passing on to others, treating them in the same way. The southern grower, who is raising cantaloupes for the northern market often suffers heavy loss from the attacks of this insect.

Remedies.—So far as known to the writer, no successful remedy for this insect has ever been discovered, although a free use of the arsenical sprays, such as are used against the striped beetle and other leaf-eating insects, may be expected to give some relief. Rotation of crops and other up-to-date methods of farming are also recommended. Fall plowing the melon field is also a good practice, especially in the more northern and middle states.

The Melon Caterpillar *(Diaphania hyalinata,* Linn.).—This species is closely related to the pickle moth, and they resemble each other in many respects in both the adult and larval stages. In this case, however, the larva confines its attacks mostly to the foliage of the muskmelon, especially during the early part of the season. It is confined almost exclusively to the southern states.

Remedy.—As it begins its attacks on the foliage, it may be easily held in check by spraying with one of the arsenical compounds.

Grasshoppers.—In some sections of the West, the grasshoppers often become quite troublesome, especially in the watermelon fields. They are difficult to manage; they, of course, chew the leaves and young stems, and so some good may be accomplished by spraying with arsenate of lead, using two pounds to 50 gallons of water. Grasshoppers, like cutworms, are fond of sweetened bran, and therefore much may be done towards destroying them by thoroughly mixing one or two pounds of paris green and 40 or 50 pounds of wheat bran together and moistening with just sufficient water to dampen the whole mass; then add to this two pounds of sugar and mix thoroughly. A teaspoonful of this mixture placed near the vines will accomplish the work.

Mice and Gophers or Ground Squirrels.—These little animals are often very troublesome in the melon fields by digging out and eating the melon seeds after they have been planted. They often destroy the young plants after they are up. The poisoned bran recommended for grasshoppers will often have a good effect upon these. Good results have been obtained by soaking melon, squash or pumpkin seeds overnight in a strong solution of arsenic and then scattering them about the hills. Poisoned wheat is also recommended.

There are a few more species of insects which are more or less troublesome to melons which are grown in the greenhouse. A discussion of these will be found under the head of "Forcing melons."

I desire here to emphasize the fact that in dealing with nearly, if not all, of the various melon insects, much may be done towards holding them in check by a careful, clean system of farming. We have

seen that some of the most destructive species pass the early and late seasons in feeding on weeds or other plants. Destroy these by clean cultivation. Then the most of them pass the winter under various kinds of rubbish. Clean up and burn all harboring material of that kind, and so destroy their winter quarters. Then, too, if melon growers would practice a regular three or four-year rotation of crops, much of this insect trouble could be avoided.

DISEASES

Bacterial Wilt *(Bacillus tracheiphilus,* Smith).— There is probably no disease attacking the cucurbitaceous plants which has spread over so wide a territory in the last few years and which has so baffled the scientists in their efforts to find a means for its control as this. It was discovered in 1893 by Dr. Erwin F. Smith of the department of agriculture, attacking cucumbers and muskmelons, and since that time much thought and labor have been expended in trying to find a practical remedy or means of preventing the disease. Up to the present time, however, it may be classed with the pear blight in this respect. Dr. Smith has proved very conclusively, however, that the disease is due to a specific bacterial organism, and that it is conveyed from diseased to healthy plants by means of the striped cucumber beetle *(Diabrotica vittata)*, and he is also of the opinion that it is communicated by the squash bug *(Anasa tristis)*.

The disease may make its appearance at almost any time during the summer and spread more or less rapidly as favorable or unfavorable conditions seem

Fig. 16. A field of Tip Tops nearly ruined by the bacterial wilt.

to prevail. It is not very probable that the germs are carried over in the soil from one season to the next, as the writer has seen fields of cantaloupes entirely destroyed by this disease which were planted on soil which had not grown a crop of cantaloupes for twenty years. Most melon growers are familiar with the characteristic appearance of the disease. As soon as the germs enter the leaf or leaf stem, they multiply very rapidly, until the circulation of sap is cut off by clogging of the water ducts, when that portion of the leaf beyond the point of attack wilts and dies. As stated above, it has been clearly demonstrated that the disease may be spread by means of the striped cucumber beetle, and possibly others. Destruction of the leaf-eating insects, therefore, is the treatment recommended. Fig. 16 shows the effects of this disease in a field of Tip Top melons.

Bacterial Soft Rot of Muskmelons *(Bacillus Melonis*, Giddings).—Bulletin 148 by N. J. Giddings, Vermont experiment station, treats of a new species of bacillus which attacks the muskmelon, producing a soft rot similar to that of other vegetables, but the organisms differ from the soft rot type—*Bacillus caratovorus*. Wound inoculations in the muskmelon generally gave a complete decay in from three to seven days, but those made upon the broken skin produced no effect whatever. These experiments show that the disease is capable of being communicated to a variety of plants through cracks or wounds, but the muskmelon seems to be its favorite host plant.

As this is liable to become a troublesome disease in other portions of the country, I quote from the

bulletin a few sentences concerning remedial measures recommended. "Of course any remedial measures must aim at prevention rather than cure, and must, therefore, be taken before the disease becomes widespread. Spraying with bordeaux mixture is to be commended as a general preventive of this and related melon diseases. Supporting the melons on stones or otherwise to keep them from contact with the soil, and occasional turning, will doubtless give better results than can be secured in any other way. Whenever practicable, irrigation should be practiced in a dry time, to insure uniform and continuous growth and to avoid cracking of the fruit. Diseased melons in a field should be immediately removed and destroyed, and the crop should be carefully watched for the first appearance of the rot, in order to keep the organisms from the field as much as possible, since the disease may readily be carried from one melon to another by insects. A field in which the rot has been seriously prevalent should not be used the next season for the growth of melons. An interval of at least three years should intervene between melon crops in such cases. Rotting melons should not be thrown on the compost heap, or be fed to stock; or else, in case this is done, compost or manure from such animals should not be used on melon fields.

"It is probable that little trouble will be experienced during a season which is continuously dry. If, however, the entire season is unusually wet, or if heavy rains follow a dry period, the danger is increased. Under such conditions, especial care should be exercised in spraying with bordeaux mixture and in so supporting and turning the melons

as to keep all sides exposed to light and air as much as possible. The disease, once started in a wet field where no such precautions are taken, spreads very rapidly, and a melon once infected is lost."

Rust or Blight *(Alternaria*, sp. *Peglion)*.—The first man to prove that this disease of the cucumber and muskmelon was due to this fungus was Peglion in Italy. About the same time Dr. Erwin F. Smith, of the department of agriculture, worked out the same thing and came to practically the same conclusions, but owing to difficulty in finding the perfect form of the fungus, but little has ever been published on the subject in this country. Next to the bacterial wilt, it is one of the most serious diseases with which the cantaloupe grower has to contend, as, unless the proper remedies are applied, it will often destroy whole fields of melons in a short time.

The disease first shows itself in the form of little brown spots on the leaves, and as the disease progresses these spots continue to grow, until they finally run together, and the whole leaf becomes brown and dry. Like most diseases of this nature, a warm, damp atmosphere is very favorable to the germination of the spores, so during a rainy season the disease is usually much more prevalent than during a dry season. We find, too, that if a melon field is somewhat rolling, so that portions of the field are higher than others, those plants on the high places are much more exempt from the disease than are those on the low ground, as there is a better circulation of air on the high places, and the plants dry off quicker after a rain or heavy dew.

In some seasons, this disease will make its ap-

pearance early when, if the proper remedies are not applied at once, the entire crop is destroyed. At other times much of the fruit will have nearly reached maturity before the disease shows itself, when it may ripen, and appear to be in good condition, but upon testing it, it will be found to be insipid and of very poor quality. Such melons are often put upon the market, which is a very ques-

Fig. 17. A field of melons destroyed by the rust.

tionable proceeding, to say the least. Fig. 17 shows the effect of this disease.

As this is strictly a fungous disease, it is easier to control than are those of a bacterial nature. Experiments have shown that by spraying the vines several times during the season with bordeaux mixture, the vines may be kept practically free from the disease. A 4-6-50 mixture, applied four times at intervals of a week or ten days, will usually keep the

leaves clean and healthy. The time of the first spraying will depend somewhat upon the character of the season, but it should be made as soon as the first indications of the disease show themselves. Keep in mind the fact that it is easier to prevent a fungous disease than to cure it. On a small scale a hand spray pump may be used, but for a number

Fig. 18. The rust may be held in check by spraying with the bordeaux mixture.

of acres, a barrel pump, mounted on wheels, or a pump with a row attachment, such as is used for spraying potatoes, will give good satisfaction. Fig. 18 shows a field that was sprayed with bordeaux mixture.

Fusarium Wilt *(Neocosmospora vasinfecta,* E. F. Smith).—This disease is to the watermelon what the bacterial wilt is to the muskmelon. Of recent

discovery, it has spread over a wide territory and has made its presence known in more than one watermelon field. As it is supposed to have several host plants, namely, watermelon, cotton, and cowpea, it is capable of being spread wherever any of these plants are grown, and that means over the greater portion of the United States. Ten years ago it was confined to a somewhat limited area, so far as its effect upon the watermelon crop was concerned, but now it is found spread over a large portion of the melon-growing territory in the middle West and southern states.

It is not especially influenced one way or the other by climatic changes. In fact, it seems to thrive as well in a winter temperature of 15 or 20 degrees below zero as it does in localities where the temperature scarcely ever reaches the freezing point. The fungus remains in the soil for an indefinite period, and is ready to germinate and grow whenever the proper host plant presents itself and the weather conditions are favorable.

The effect on the watermelon is similar to that of the bacterial wilt on the muskmelon—a wilting of the leaves and drying up of the entire plant, as though the water supply had been suddenly cut off. And, indeed, this is just what happens, as the fungus finds an entrance into the plant through the root system, and as it develops it clogs up the ducts, thus preventing the moisture, which is taken up by the roots, from reaching the foliage. This can be readily seen by examining a cross-section of the stem near the roots under a microscope The infected part will also show a dark discoloration not found in a healthy plant.

A careful study of this disease in different portions of the country seems to indicate that a long rotation of crops, extending over five or six years, will assist very greatly in keeping down the disease, as the germs are carried over from year to year

Fig. 19. A rust-resistant Rocky Ford; note the fine netting.

in the soil. In no case should watermelons follow watermelons two years in succession. Then, too, all diseased vines should be burned and all infected fruit be disposed of in some place where the land will not be used for growing melons.

Disease-Resistant Plants.—If we go into a melon field where this disease is quite prevalent, we will usually find here and there plants which are per-

fectly healthy and which apparently have the power to resist or to throw off the disease. In fact, some varieties seem to have that inherent quality, which enables them to escape the disease, while others in the same field succumb to it. This fact enables the plant breeder to make his selections of fruits for seed from these apparently immune plants, and so, after a time, to produce a disease-resistant strain.

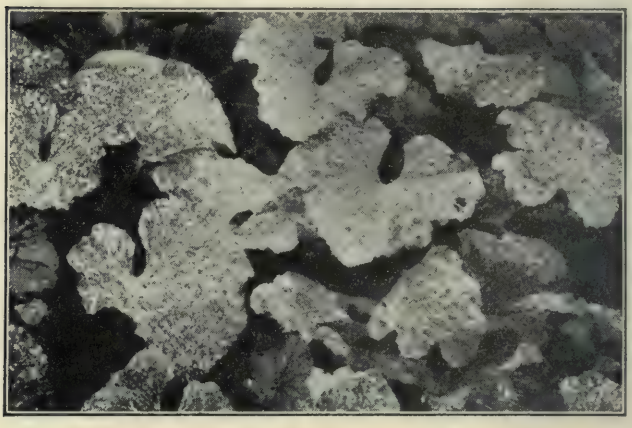


Fig. 20. A well-sprayed melon vine.

(Fig. 19.) Let it be understood, however, that a disease-resistant strain which has been developed in one section of the country will not necessarily remain resistant when grown in some other locality under very different climatic conditions. The tendency, however, is for it to become resistant under its new environments much quicker and more easily than if it had never developed that quality.

Experiments have proven that a resistant variety

in Colorado, brought to the moister climate of the Ohio valley, developed the old tendency to disease again, but by careful selection after the second or third generation, under its new environment, it again became as resistant as before. And so, with only our present knowledge of these fungous and wilt diseases to guide us, it would seem that the only satisfactory remedies which may be safely recommended are a long rotation of crops and careful selection and breeding of varieties which are immune to the disease.

There are a few other diseases which are more or less common on cucurbitaceous plants and which affect the melon with the others, such as the

Scab *(Cladosporium cucumerinum,* Ell. & Arth.).— On melons it produces small, sunken spots, mostly on the fruit, but sometimes on the stems. It is mostly present during very wet weather.

Anthracnose *(Colletotrichum lagenarium,* Pass.).— This disease affects both fruit and leaves, producing brown spots on the leaves and small sunken spots which cause the fruit to rot.

Downy Mildew *(Plasmopara cubensis,* B. & C.).— Most common on cucumbers, but it affects all kinds of cucurbits. A full account of this disease may be found in Bulletin No. 119, New York Experiment Station. (Fig. 20.)

CHAPTER XI

LIST OF VARIETIES

The following alphabetical list includes most of the varieties commonly grown in the different sections of the United States. There may be some more or less local varieties which have been overlooked. There are also numerous strains of the different varieties of both muskmelons and watermelons, which are more or less local in character;

Fig. 21. The Rocky Ford is a favorite variety with most growers.

in fact, it often happens that a grower will have some particular strain which he has developed by a long process of selection and which is peculiarly adapted to his soil and situation, and he regards it as superior to the original variety, and that is often true. (See Fig. 21.) Such strains, however, often prove disappointing when the seed is carried to

Fig. 22. A trio of Tip Tops from the Ohio valley.

other localities and planted in different soils and grown under different climatic conditions.

Varieties have their preferences as to soil and climate; hence it often happens that one variety will prove valuable in one locality and very undesirable in another. Hence, the necessity for the large number of varieties which we now have in the United States. For example, in one of the large melon districts of the middle West, the Rocky Ford

type of cantaloupe, which can be shipped in crates and baskets, is very popular and almost universally grown, while in another section of the same state, the Tip Top, a larger, rougher melon, is grown, and these can be easily shipped in bulk, like watermelons. (Fig. 22.) To be sure, the market plays an important part when it comes to the selection of varieties of melons, as it does in the selection of varieties of fruits; hence, before going into the business on a large scale, it is always best to ascertain, either by experience or observation, which varieties are best suited to meet the existing conditions.

But we will find this to be true among melons as well as among fruits, that there are a few varieties which may be depended upon under almost any conditions—such as the Emerald Gem and Rocky Ford muskmelons, and the Kolb's Gem and Georgia Rattlesnake watermelons.

In the following list a brief description is given of each variety for the benefit of those whose knowledge of varieties may be somewhat limited.

LIST OF VARIETIES

MUSKMELONS

Acme.—Fruits medium size, oval in form, with a slight neck at the stem end; well ribbed and heavily netted; skin a golden color when ripe; flesh firm and of good quality.

Admiral Togo.—Fruit medium in size; flesh orange and very meaty, leaving a very small seed cavity. Quality fine.

Arlington Nutmeg.—A favorite in the Boston market on account of its fine flavor; flesh green and ripens early.

Baltimore Market.—Oblong in shape, flesh orange, of fine flavor; midseason.

Banana.—This name comes from the fact that the fruit is long and slender, with a banana-like aroma when ripe. The salmon-colored flesh is quite thick and firm, and is thought

by many people to be of excellent flavor, although most people would prefer the Rocky Ford or Emerald Gem.

Banquet.—Fruits are well netted, medium size; flesh salmon color and of excellent quality.

Bay View.—Fruit long, often a foot or more, oblong, quite heavily ribbed and netted, good quality and fine for home use.

Burrell's Gem.—Fruit oval in shape and of fairly good size; flesh an orange color, and has a very agreeable, spicy flavor.

Cassaba.—Fruit large; flesh green and of good quality. One of the largest muskmelons grown.

Champion Market.—Fruit resembles the Netted Gem, except that this is much larger; the flesh is green and of fine quality and a good shipper. Ripens early.

Chicago Market.—This is one of the larger types of uniform size; skin thickly netted; seed cavity quite small; flesh green, of fine flavor; ripens early, but is a good keeper.

Cosmopolitan.—"It is said to combine the firm, sweet flesh of the French cantaloupe with the delicious flavor of the American muskmelon." A very handsome, green-flesh fruit, slightly oval, without ribs. Color, light green, but at maturity it is covered with a dense silver-gray netting.

Defender.—This is one of the best of the yellow-flesh varieties, of medium size, oval in shape; flesh firm and rich. Vines vigorous and productive. Needs plenty of room.

Early Christiana.—Fruit yellow-fleshed, very rich and juicy.

Early Citron.—An early, flattened sort; flesh green and of fair quality.

Early Hackensack.—Much the same as Hackensack, but ripens about ten days earlier. A strain of the old variety.

Emerald Gem.—Fruit small, round, dark green; orange-colored flesh and very sweet; one of the best for home use and near-by market.

Fordhook.—Fruit medium in size; flesh thick, orange-yellow color, of the highest flavor when well grown. A good shipper in baskets or crates.

Garden Lemon.—Or Lemon Cucumber; fruits nearly round, yellow ground with green markings; a smooth skin; flesh very tender, and has a sweet, melon flavor. It is principally used for flavoring. Does not belong with the garden melon, botanically speaking.

Golden Jenny.—A small, very early variety; a good shipper; said to be an improvement on the Jenny Lind.

Hackensack.—This is one of the old, popular varieties, largely

grown in certain sections. The fruit is large, nearly round and of good quality.

Honey Drop.—Fruit round, somewhat flattened at the ends; of good size; flesh thick, sweet and melting; a deep orange color; ripens very early.

Hoodoo.—A popular variety in the Chicago market, where it brings the highest prices on account of its high quality. It is about the size of the Rocky Ford, but more round; flesh deep orange, with a small seed cavity.

Jenny Lind.—This is a small green-fleshed variety of fine quality and ripening very early.

Jersey Belle.—It is not so early, but much like Jenny Lind. Fruits flattened at the ends, with heavy ribs and coarsely netted. Flesh, green and good.

Kinsman's Queen.—Similar to Emerald Gem in shape and quality, but much larger.

Knight.—This is a popular variety in certain portions of Virginia, but is not very widely known.

Livingston's Market.—Said to be able to withstand drought and other discouragements better than most other varieties; flesh green, of good quality.

Long Island Beauty.—This is of the Hackensack type—a very handsome early melon of the finest quality. It is popular in the eastern markets.

McCotter's Pride.—A late variety, which has been bred for large size, but it has a fine-grained flesh and high quality. Nearly round; only moderately ribbed; dark green color; orange flesh, which is very thick, sweet, and of fine flavor.

Mammoth Prolific.—A large-fruited variety, weighing from 12 to 15 pounds; deeply ribbed and covered with a coarse netting; flesh green and thick, with a fine flavor; ripens late, but the vine is quite hardy.

Mango Melon.—Sometimes called vegetable peach. About the size and color of an orange, with a white flesh. Used for making sweet pickles and preserves. Belongs with Garden Lemon.

Matchless.—Fruit of the Netted Gem type, but of larger size than that variety; averaging about 5 by 6 inches in diameter. The flesh is very thick, light green in color and of good quality. It is a good shipper.

Melrose.—This is a very popular variety with some growers. It is nearly round, dark-green skin, changing to a russet color as it approaches maturity. There are no ribs, but it is thickly netted. The fruits run about 6 inches in diameter, with a thin but tough skin, making it a very good

shipper. The flesh is light green, shading to a rich salmon color at the seed cavity. The flavor is excellent.

Milwaukee Market.—Fruit light green, nearly round, slightly ribbed; flesh salmon color, of good quality; especially adapted to the home garden.

Montreal Market.—A well-known variety, with flattened fruits, which are heavily ribbed. The flesh is green and of good quality. This is one of the old stand-bys in certain sections of the country, especially in Canada near Montreal. It finds a ready sale in the Boston market.

Netted Gem.—A very popular variety in the middle West, where it is largely grown for shipping in crates and baskets; fruit round or slightly oval, rather small; green flesh of high quality. There are various strains of this variety, generally known by the shape.

Netted Rock.—A new variety about the size of the Rocky Ford, but more heavily netted; seed cavity small; the green flesh thick and very sweet. It is claimed by the originator to be practically rust-proof and well adapted for both market and home use.

New Dandy.—This was introduced to the trade in 1909, and is described as being of a roundish shape, dark green, nicely netted, quite early, and very prolific. Size medium to large, with a fine quality.

Nutmeg.—This name is very loosely used, it being applied to almost any of the smaller varieties. This, however, is a very early green-fleshed variety, of excellent quality, and was named from its shape.

Ohio Sugar.—This is a green-fleshed Tip Top, said to be the sweetest and most luscious green-fleshed variety now on the market. Shape round, slightly inclined to oval; heavily ribbed and netted; skin grayish green; very prolific and solid enough for a good shipper

Osage or Miller's Cream.—The fruit is similar in shape to the Emerald Gem, but larger; dark green with light bands between the ribs; flesh thick, orange color, and of good quality. One of those varieties which are widely known among melon growers.

Paul Rose.—This variety gets its name from the originator, who is one of the largest melon growers in the middle West. It belongs to the Rocky Ford type, oval in shape, orange flesh, which is very sweet. A very handsome and popular variety where known.

Prolific Nutmeg.—A large-fruited variety, which is slightly flattened at the ends. Its quality is only medium.

Rocky Ford.—This is a very popular variety in the West and

South, as it is of convenient size to ship well, and is early in maturing. Many of the large growers look to Rocky Ford, Colorado, for their seed each season, and in this way are able to keep up the standard of excellence which is found in this variety, for it is a well-known fact that different soils and climate, together with the different methods of cultivation, will often affect, not only the quality, but the general type of melon produced. The Rocky Ford is an improved type of the Netted Gem, and when well grown is very sweet and fine flavored, scarcely excelled by any variety grown in its territory.

Rose Gem.—Said to be an improvement on the Netted Gem.

Skillman's Netted.—Fruits are oval in shape; ripens early; green flesh; sweet, with a rich perfume.

Spicy.—This is one of the larger new sorts, sometimes measuring 9 or 10 inches in length and two-thirds as wide. The fruit is very solid, with a small seed cavity; flesh very thick and of a rich salmon color, with a fine flavor. The surface is smooth, except a slight netting, becoming a grayish yellow as it approaches maturity.

Strawberry—A very nice, red-fleshed variety, with a sweet strawberry flavor, weighing from six to eight pounds.

Surprise.—Fruits oblong in shape, with a rich orange flesh of good quality. Ripens early.

Sweet Air.—A comparatively new variety, grown to some extent in Virginia.

Syracuse.—This is one of the larger melons, with good quality. The surface is grayish green, with a light-green flesh. Also somewhat local in character.

Texas Cannonball.—So named because of its round shape. It is handsomely netted, with a green flesh, and is said to be very prolific under good cultivation.

The Grand.—This is a popular variety in the middle West, where it is grown quite extensively. It is too large for packing in baskets or crates, and so is usually shipped in bulk like watermelons. The fruit is nearly round, somewhat flattened at the ends, strongly ribbed, and slightly netted. Flesh yellow, sweet and juicy, of high quality.

White Japan.—An early variety, with a white skin and light-green flesh; belongs in the novelty class.

English Frame Varieties

Grown in frames or hothouses, both in Europe and America.

Blenheim Orange — *Lord Beaconsfield*
Eclipse — *Red-fleshed Prescott*
Royal Favorite

French Varieties

Also grown in frames, but will grow out-of-doors in this country under favorable conditions:

Delight of the Table	*Tours Sugar*
Noir des Carmes	*Trevoux*

Some Good Forcing Varieties Grown in This Country

At Superb.—Scarlet flesh.
Best of All.—Green flesh.
Diamond Jubilee.—Green flesh.
Frogmore Scarlet.—A handsome scarlet-fleshed variety; fruit oval, closely netted, and of excellent flavor.
Hero of Lockinge.—Fruit with white lacing on a yellow ground; flesh white; fine flavor.
Invincible Scarlet.—Scarlet flesh of good flavor.
Ne Plus Ultra.—Fruit globe-shaped, flesh white, very thick, and of fine flavor.
Royal Sovereign.—White flesh of excellent flavor.
Turner's Seedling.—A high quality melon, originating in New Jersey.

WATERMELONS

Alabama Sweet.—This is grown quite largely in the South for northern markets, as it ships well, having a firm rind, dark-green striped. Flesh bright red, with white seeds.
Angel Kiss.—A very popular variety in the South and West for home use. It is quite early and of fine quality. Ripens about with the Halbert Honey. Size medium, thin rind, nearly white; crimson flesh, with small white seeds.
Arkansaw Traveler.—Is much like the Florida Favorite, and is grown more in the South than in the North.
Augusta Round.—This is a midseason variety; round, with a bright-red flesh, very sweet, with white seeds.
Black Boxelder.—Large, dark, green skin; nearly round.
Black Diamond.—Large, round, dark green, with a tough skin, making it a good shipper. A popular variety wherever grown.
Black Spanish.—Roundish in form, with a very dark skin and deep-red flesh; ripens early.
Boss.—Oblong in shape; dark green in color; flesh deep scarlet; ripens midseason.
Bradford.—This is a long melon of dark color with a sweet, tender flesh.
Citron (green-seeded and red-seeded).—Used for preserving.

Coe's Early.—A small, early variety, with a green skin with white stripes.

Colorado Preserving.—This is a large-fruited citron, used only for preserving.

Cuban Queen.—This is a native of the West Indies, and was introduced into this country in 1881. It has become very popular in many sections of the country. It is a large, oblong melon with well-marked light and dark-green stripes.

Dark Icing.—The fruit is roundish oval in form, skin dark green; deep pink flesh of excellent quality. Very popular in the East as a market variety where quality is the principal consideration.

Dixie.—This is noted in the South for its market qualities owing to its large size under good cultural conditions. The color is dark green, with lighter stripes; flesh bright red and the quality excellent.

Duke Jones.—A dark-green variety of good size and fine flavor.

Earliest and Sweetest.—A new variety said to be the earliest and sweetest watermelon known. Size medium, averaging 10 to fifteen pounds, about twice as long as broad, dark ground with lighter markings; flesh scarlet, seeds white or light cream. A cross between Mountain Sweet and Cole's Early.

Florida Favorite.—This is highly prized in the South as a market melon, many carloads of them being sent North. It is also highly prized in the home market. Many of the larger Northern growers also look upon it as one of their most reliable varieties. The fruit is large, oblong in shape, with a dark green rind, with still darker stripes. It presents a beautiful appearance in the field, as well as upon the market stands.

Fordhook Early.—This is one of the earliest of the large-fruited melons and is becoming quite generally grown, as it ripens several days earlier than any of those commonly grown. The fruit is rather short and blocky, dark green in color, faintly striped with lighter green. The quality is excellent.

Gray Monarch (Long White Icing).—A large, long, light-colored melon, somewhat mottled; deep red flesh of fine flavor. It often weighs from 50 to 60 pounds under good treatment.

Halbert Honey.—This variety is intended for the home garden and nearby markets, as it will not stand shipping as well

as some of the other varieties. It is especially noted for its thin rind, fine flavor, and productiveness.

Harris's Earliest.—A small, very early melon of only fair quality, but brings good returns on account of its earliness.

Hungarian Honey.—A small, round variety, with deep-red flesh noted for its fine quality. Too small for the larger markets.

Iceberg (Blue Gem).—A large, oval melon, with a rich dark green color, striped with a lighter green. Very highly prized in certain localities.

Ice Cream (Peerless).—Oblong in shape, dark green in color; flesh a bright pink, with a very sweet delicious flavor. Especially desirable for the home market.

Iced Honey.—A new early variety, rather small but fine for home use. Fruit nearly round and of dark green color; flesh dark red, with a rich honey flavor.

Kleckley Sweets (Monte Cristo).—A well-known variety that is prized for its delicious flavor. Especially desirable for home use and the nearby market, where quality is preferred to size. The fruits are oblong in shape and dark green in color.

Kolb Gem.—This variety is probably as well known both north and south as any other variety grown, as it is one of the best shipping melons. Oval in shape, with skin mottled with light and dark green; the quality is not equal to that of some of the other varieties.

Light Icing.—This differs from the Dark Icing mainly in having a light-colored skin. The shape and quality are nearly the same.

McIver Sugar.—This is one of the good, large melons of oval shape, a foot and a half in length; skin dark green, with lighter stripes; flesh a light pink, crisp, and juicy.

Mammoth Ironclad.—This is noted for its very large size, being long in shape, a very late and good shipper.

Mountain Sweet.—A red-fleshed late variety, noted mainly for its sweetness. Very popular in the South.

New Chilian.—This is a very attractive melon, but better adapted to a southern climate than to the North. The fruit is large, round, dark green, with darker stripes. Quality good when well grown.

Panmure Allheart.—A favorite variety in some parts of the South. It has a thin rind, few seeds, and a very thick, sweet flesh. An excellent melon for the home garden.

Phinney's Early.—Oblong shape of medium size, but early and of good quality.

Pride of Georgia.—A popular variety in the South. Fruit nearly round, of large size and good quality. Ripens in midseason.

Primus Jones.—A large, quite late melon, dark green, with light stripes, oblong in shape; flesh red and very sweet; highly prized in the South.

Rattlesnake (Georgia Rattlesnake; Striped Gypsy).—This is doubtless the most popular variety grown in the southern states, and it is also grown quite extensively in the more northern Mississippi valley. The fruit is oblong, of good size, handsomely striped, a good shipper, and of fine quality.

Santiago.—Sometimes called Mammoth Santiago on account of its large size. It is oval in shape, skin light green with darker stripes, somewhat mottled. The flesh is deep red, of fine quality. The rind is firm enough to make it a good shipper.

Seminole.—This is a very large melon, ripening in midseason, and of good quality.

Shaker Blue.—Sometimes called the White Seeded Triumph. It is a very large melon, roundish oval in form, weighing all the way from 40 to 75 pounds as grown in portions of the Mississippi valley. The color is dark green, with lighter stripes, but these are not very apparent when the melon is ripe. It is a good shipper and the quality is fine.

Snowbound.—A medium-sized melon suitable for either the home garden or for shipping, as it has a tough rind. Skin is gray, flesh, light pink, very tender and sweet.

Sugar Stick.—A large light-green variety, of oblong form, and when well grown it combines fine flavor with good shipping qualities.

Sweetheart.—A very popular variety in the middle West, as it combines size and fine quality with a firmness of rind which makes it a good shipper. It has a pale-green skin, with slight markings; a deep-red flesh, which is very crisp and sweet. Where the seed is kept pure the size is usually very uniform, running from 40 to 50 pounds.

Sweet Nabob.—An early variety, round in form, striped with light and dark green; of good quality.

Tom Watson.—This is coming to be quite well and favorably known in the middle West. In form it is long, oval, often measuring 2 feet long and 1 foot in diameter, and weighing from 50 to 60 pounds. The rind is very thin, but tough enough to make it a good shipper. The quality is very fine when grown on the melon soil of southern Indiana.

Triumph.—This is a well-known, large, rather short and thick variety, of good quality, and a splendid shipper.

Turpen's Gray.—A fine, late variety much planted in the South. It grows very large and long, and is a long keeper. Skin mottled green; rind very thin; flesh red and sweet, with yellowish seeds.

Vick's Early.—A very early, long, smooth melon; bright pink flesh of fine flavor.

INDEX

Page

A

Age of melon seeds affecting vitality 19
Air-slacked lime for striped beetle 70
Alternaria sp. on muskmelons 83
Anthracnose of melons..... 89
Aphis Gossypii or melon louse.... 72
Aphis in the forcing house 66
Arthur, J. C., quotations from.... 25

B

Bacillus melonis..... 81
Bacillus tracheiphilus..... 79
Bacterial soft rot of muskmelons.. 81
Bacterial wilt..... 79
Bees: their influence on the crop.. 6
Blinn, P. K., quotations from.... 24
Bordeaux mixture.....82, 85
Botanical varieties:
Cantaloupensis 4
Reticulatus 5
Flexuosus..... 5
Chito 5
Inodorous 5
Botany of the melon..... 2

C

Cantaloupes 4
Characters of the flowers..... 2
Citrullus vulgaris 6
Cladosporium cucumerinum..... 89
Clean farming a prevention against insects 78
Climax baskets for muskmelons... 53
Clover as a fertilizer..... 30
Colletotrichum lagenarium..... 89
Commercial fertilizers..... 33
Conditions affecting growth:
Climatic..... 9
Soil 9
Temperature of the soil..... 9
Cottonseed meal as a fertilizer for melons 33
Cucurbitaceae family 2
Cultivation of the plants..... 45
Cultural methods 41

D

Depth of planting in the North and South 35
Diabrotica 12-punctata..... 72
Diabrotica vittata 68
Disease-resistant strains..... 87

Page

Diseases of melons..... 79
Dome screens for insects..... 70
Downy mildew on melons..... 89
Drainage: its effect on the soil... 10

E

Early planting as a protection against insects..... 71
Early vs. late ripening for seed.... 26
Effect of latitude and altitude on early maturity..... 28
Extent of the melon business..... 59

F

Fertilization of the blossoms..... 6
Fertilizers for melons:
Kind and quantity..... 30
A balanced ration..... 31
Time for applying..... 34
Forcing melons..... 61
Function of root hairs..... 12
Fusarium wilt..... 85

G

Germination of seeds, per cent of 20
Goff, Prof. E. S., quotations from 11, 18, 25
Gophers and field mice injurious to melon crops..... 78
Grading melons an important factor in maintaining one's reputation 55
Grasshoppers injurious to watermelons 78

H

Habitat of the muskmelon and watermelon 1
Harvesting and marketing melons 46
History of the melon..... 1
Hotbeds, construction of..... 37
Hothouse: its advantages over the hotbed 40
How to test the seed..... 20
Humidity affecting seed vitality.. 19

I

Immature seed: its effect upon earliness..... 25
Importance of careful selection of seed melons: how it is usually done 22

Page

Insects and diseases..... 68
Insects in the forcing house..... 65
Introduction of melons into the United States..... 2

K

Keep the melons as cool as possible after picking..... 51

L

Land plaster for the striped beetle 70
Lead arsenate for melon insects.. 70
List of varieties of melons..... 92
London purple for the striped beetle..... 70

M

Mango melon—see variety Chito.. 5
Marketing melons.....57-60
Marking the crates..... 55
Mealy bugs in the forcing house.. 66
Melon caterpillar..... 77
Melon louse..... 72
Melons as warm weather plants... 9
Melon scab..... 89
Melon seed, conditions affecting duration of..... 19
Mice and ground squirrels..... 78
Moisture affecting seed vitality... 19
Muskmelons 3, 92

N

Navy beans for anchors..... 44
Neocosmospora vasinfecta..... 85
Number of plants required to plant an acre..... 42
Number of watermelons to load a car 60
Nutmeg melons..... 4

O

Oxygen necessary to plant growth 11
Oxygen: the effect of its absence noted 11

P

Packing as it is usually done..... 52
Packing in crates and barrels..... 53
Paris green for the striped beetle.. 70
Pickle worm 76
Plant boxes..... 37
Planting the seeds for forcing..... 63
Planting the seeds out-of-doors... 35
Plant plenty of seeds..... 36
Plants required for an acre..... 42
Plasmopara cubensis 89
Poisoned seeds for field mice and gophers 78
Pollination of flowers: how it is done 6
Pony crates for muskmelons.. .. 53

Page

Preparation of the soil for melons. 14
Protoplasm: the life of the plant.. 11

Q

Quality an important factor in melons; affected by time of picking 48

R

Red spider in the forcing house... 65
Refrigerator cars for shipping muskmelons 48
Remedies for field mice..... 78
Remedies for gophers and ground squirrels 78
Remedies for grasshoppers..... 78
Remedies for striped melon beetle 70
Remedies for the melon louse.... 73
Remedies for the pickle worm.... 77
Remedies for the squash bug..... 75
Remedies for the squash lady-bird 76
Remedies for 12-spotted melon beetle 72
Remedy for the melon caterpillar. 77
Road dust for the striped beetle.. 70
Root hairs: their function..... 12
Rotation of crops a prevention against insects..... 79
Rust or blight of melons..... 83
Rust-resistant strains of melons.. 87

S

Sandy soil for melons..... 14
Scab on melons..... 89
Screen for covering young plants 71
Seed germination, per cent of.... 20
Seed started in the hotbed..... 37
Seed tester..... 21
Seed vitality, conditions affecting it 18
Seeds from immature fruits..... 25
Selecting the seed melons from unproductive plants vs. productive plants..... 22
Slacked lime for melon insects.... 70
Smith, Dr. E. F., on bacterial wilt 79
Snake melon—see variety Flexuosus..... 5
Soaking seed in arsenic for mice and gophers..... 78
Sods for starting melon seeds in the hotbed 39
Soils for melons..... 14
Soy beans as a fertilizer..... 30
Sprays for the melon louse..... 74
Squash bug 74
Squash lady-bird 75
Stable manure: how used..... 34
Starting the plants in hotbeds.... 37
Starting the plants in hothouses.. 40
Stimulating the plants to quick and early growth as a means of preventing insect attacks.. 72
Style of package..... 53

Page

T

Temperature affecting seed vitality 18
Temperature for forcing melons 62
Testing the seed 20
The forcing house 62
The function of root hairs 12
The melon aphis 72
The melon caterpillar 77
The pickle worm 76
The seed 18
The soil 63
The soil for forcing melons 63
The soil: Nature's chemical laboratory 12
The squash bug 74
The squash lady-bird 75
The striped beetle 68
The 12-spotted melon beetle 72
Tile drainage: how it acts upon the soil 10
Training the plants in the forcing house 64
Transplanting: distance apart for each kind 41
Trap crops as a protection against insects 71, 75

V

Varieties for forcing 65
Varieties for outdoor culture 92
Vitality of seeds affected by various causes 18

W

Watering the hotbeds 39
Watermelons 6
Wheat bran and paris green for grasshoppers 78
White fly in the forcing house 66
Winter melons—see variety Inodorous 5

Y

Yields per acre 59

STANDARD BOOKS

PUBLISHED BY

ORANGE JUDD COMPANY

NEW YORK
ASHLAND BUILDING
315-321 Fourth Avenue

CHICAGO
PEOPLE'S GAS BUILDING
150 Michigan Avenue

Any of these books will be sent by mail, postpaid, to any part of the world, on receipt of catalog price. We are always happy to correspond with our patrons, and cordially invite them to address us on any matter pertaining to rural books. Send for our large illustrated catalog, free on application.

First Principles of Soil Fertility

By ALFRED VIVIAN. There is no subject of more vital importance to the farmer than that of the best method of maintaining the fertility of the soil. The very evident decrease in the fertility of those soils which have been under cultivation for a number of years, combined with the increased competition and the advanced price of labor, have convinced the intelligent farmer that the agriculture of the future must be based upon more rational practices than those which have been followed in the past. We have felt for some time that there was a place for a brief, and at the same time comprehensive, treatise on this important subject of Soil Fertility. Professor Vivian's experience as a teacher in the short winter courses has admirably fitted him to present this matter in a popular style. In this little book he has given the gist of the subject in plain language, practically devoid of technical and scientific terms. It is pre-eminently a "First Book," and will be found especially valuable to those who desire an introduction to the subject, and who intend to do subsequent reading. Illustrated. 5x7 inches. 265 pages. Cloth. Net, $1.00

The Study of Corn

By PROF. V. M. SHOESMITH. A most helpful book to all farmers and students interested in the selection and improvement of corn. It is profusely illustrated from photographs, all of which carry their own story and contribute their part in making pictures and text matter a clear, concise and interesting study of corn. Illustrated. 5x7 inches. 100 pages. Cloth. . . . . Net, $0.50

Soils

By CHARLES WILLIAM BURKETT, Director Kansas Agricultural Experiment Station. The most complete and popular work of the kind ever published. As a rule, a book of this sort is dry and uninteresting, but in this case it reads like a novel. The author has put into it his individuality. The story of the properties of the soils, their improvement and management, as well as a discussion of the problems of crop growing and crop feeding, make this book equally valuable to the farmer, student and teacher. Illustrated. 303 pages. 5½x8 inches. Cloth. . Net, $1.25

Weeds of the Farm Garden

By L. H. PAMMEL. The enormous losses, amounting to several hundred million dollars annually in the United States, caused by weeds stimulate us to adopt a better system of agriculture. The weed question is, therefore, a most important and vital one for American farmers. This treatise will enable the farmer to treat his field to remove weeds. The book is profusely illustrated by photographs and drawings made expressly for this work, and will prove invaluable to every farmer, land owner, gardener and park superintendent. 5x7 inches. 300 pages. Cloth. . . . . Net, $1.50

Farm Machinery and Farm Motors

By J. B. DAVIDSON and L. W. CHASE. Farm Machinery and Farm Motors is the first American book published on the subject of Farm Machinery since that written by J. J. Thomas in 1867. This was before the development of many of the more important farm machines, and the general application of power to the work of the farm. Modern farm machinery is indispensable in present-day farming operations, and a practical book like Farm Machinery and Farm Motors will fill a much-felt need. The book has been written from lectures used by the authors before their classes for several years, and which were prepared from practical experience and a thorough review of the literature pertaining to the subject. Although written primarily as a text-book, it is equally useful for the practical farmer. Profusely illustrated. 5½x8 inches. 520 pages. Cloth. . . . . Net, $2.00

The Book of Wheat

By P. T. DONDLINGER. This book comprises a complete study of everything pertaining to wheat. It is the work of a student of economic as well as agricultural conditions, well fitted by the broad experience in both practical and theoretical lines to tell the whole story in a condensed form. It is designed for the farmer, the teacher, and the student as well. Illustrated. 5½x8 inches. 370 pages. Cloth. . . . . Net, $2.00

Bean Culture

By GLENN C. SEVEY, B.S. A practical treatise on the production and marketing of beans. It includes the manner of growth, soils and fertilizers adapted, best varieties, seed selection and breeding, planting, harvesting, insects and fungous pests, composition and feeding value; with a special chapter on markets by Albert W. Fulton. A practical book for the grower and student alike. Illustrated. 144 pages. 5 x 7 inches. Cloth. $0.50

Celery Culture

By W. R. BEATTIE. A practical guide for beginners and a standard reference of great interest to persons already engaged in celery growing. It contains many illustrations giving a clear conception of the practical side of celery culture. The work is complete in every detail, from sowing a few seeds in a window-box in the house for early plants, to the handling and marketing of celery in carload lots. Fully illustrated. 150 pages. 5 x 7 inches. Cloth. $0.50

Tomato Culture

By WILL W. TRACY. The author has rounded up in this book the most complete account of tomato culture in all its phases that has ever been gotten together. It is no second-hand work of reference, but a complete story of the practical experiences of the best-posted expert on tomatoes in the world. No gardener or farmer can afford to be without the book. Whether grown for home use or commercial purposes, the reader has here suggestions and information nowhere else available. Illustrated. 150 pages. 5 x 7 inches. Cloth. $0.50

The Potato

By SAMUEL FRASER. This book is destined to rank as a standard work upon Potato Culture. While the practical side has been emphasized, the scientific part has not been neglected, and the information given is of value, both to the grower and to the student. Taken all in all, it is the most complete, reliable and authoritative book on the potato ever published in America. Illustrated. 200 pages. 5 x 7 inches. Cloth. . . $0.75

Dwarf Fruit Trees

By F. A. WAUGH. This interesting book describes in detail the several varieties of dwarf fruit trees, their propagation, planting, pruning, care and general management. Where there is a limited amount of ground to be devoted to orchard purposes, and where quick results are desired, this book will meet with a warm welcome. Illustrated. 112 pages. 5 x 7 inches. Cloth. $0.50

Cabbage, Cauliflower and Allied Vegetables

By C. L. ALLEN. A practical treatise on the various types and varieties of cabbage, cauliflower, broccoli, Brussels sprouts, kale, collards and kohl-rabi. An explanation is given of the requirements, conditions, cultivation and general management pertaining to the entire cabbage group. After this each class is treated separately and in detail. The chapter on seed raising is probably the most authoritative treatise on this subject ever published. Insects and fungi attacking this class of vegetables are given due attention. Illustrated. 126 pages. 5 x 7 inches. Cloth. $0.50

Asparagus

By F. M. HEXAMER. This is the first book published in America which is exclusively devoted to the raising of asparagus for home use as well as for market. It is a practical and reliable treatise on the saving of the seed, raising of the plants, selection and preparation of the soil, planting, cultivation, manuring, cutting, bunching, packing, marketing, canning and drying, insect enemies, fungous diseases and every requirement to successful asparagus culture, special emphasis being given to the importance of asparagus as a farm and money crop. Illustrated. 174 pages. 5 x 7 inches. Cloth. . $0.50

The New Onion Culture

By T. GREINER. Rewritten, greatly enlarged and brought up to date. A new method of growing onions of largest size and yield, on less land, than can be raised by the old plan. Thousands of farmers and gardeners and many experiment stations have given it practical trials which have proved a success. A complete guide in growing onions with the greatest profit, explaining the whys and wherefores. Illustrated. 5 x 7 inches. 140 pages. Cloth. $0.50

The New Rhubarb Culture

A complete guide to dark forcing and field culture. Part I—By J. E. MORSE, the well-known Michigan trucker and originator of the now famous and extremely profitable new methods of dark forcing and field culture. Part II—Compiled by G. B. FISKE. Other methods practiced by the most experienced market gardeners, greenhouse men and experimenters in all parts of America. Illustrated. 130 pages. 5 x 7 inches. Cloth. $0.50

Alfalfa

By F. D. Coburn. Its growth, uses, and feeding value. The fact that alfalfa thrives in almost any soil; that without reseeding, it goes on yielding two, three, four, and sometimes five cuttings annually for five, ten, or perhaps 100 years; and that either green or cured it is one of the most nutritious forage plants known, makes reliable information upon its production and uses of unusual interest. Such information is given in this volume for every part of America, by the highest authority. Illustrated. 164 pages. 5 x 7 inches. Cloth. $0.50

Ginseng, Its Cultivation, Harvesting, Marketing and Market Value

By Maurice G. Kains, with a short account of its history and botany. It discusses in a practical way how to begin with either seeds or roots, soil, climate and location, preparation planting and maintenance of the beds, artificial propagation, manures, enemies, selection for market and for improvement, preparation for sale, and the profits that may be expected. This booklet is concisely written, well and profusely illustrated, and should be in the hands of all who expect to grow this drug to supply the export trade, and to add a new and profitable industry to their farms and gardens, without interfering with the regular work. New edition. Revised and enlarged. Illustrated. 5 x 7 inches. Cloth. $0.50

Landscape Gardening

By F. A. Waugh, professor of horticulture, university of Vermont. A treatise on the general principles governing outdoor art; with sundry suggestions for their application in the commoner problems of gardening. Every paragraph is short, terse and to the point giving perfect clearness to the discussions at all points. In spite of the natural difficulty of presenting abstract principles the whole matter is made entirely plain even to the inexperienced reader. Illustrated. 152 pages. 5 x 7 inches. Cloth. . . . . *Net*, $0.75

Hedges, Windbreaks, Shelters and Live Fences

By E. P. Powell. A treatise on the planting, growth and management of hedge plants for country and suburban homes. It gives accurate directions concerning hedges; how to plant and how to treat them; and especially concerning windbreaks and shelters. It includes the whole art of making a delightful home, giving directions for nooks and balconies, for bird culture and for human comfort. Illustrated. 140 pages. 5 x 7 inches. Cloth. $0.50

Bulbs and Tuberous-Rooted Plants

By C. L. Allen. A complete treatise on the history, description, methods of propagation and full directions for the successful culture of bulbs in the garden, dwelling and greenhouse. The author of this book has for many years made bulb growing a specialty, and is a recognized authority on their cultivation and management. The cultural directions are plainly stated, practical and to the point. The illustrations which embellish this work have been drawn from nature and have been engraved especially for this book. 312 pages. 5 x 7 inches. Cloth. $1.50

Fumigation Methods

By Willis G. Johnson. A timely up-to-date book on the practical application of the new methods for destroying insects with hydrocyanic acid gas and carbon bisulphid, the most powerful insecticides ever discovered. It is an indispensable book for farmers, fruit growers, nurserymen, gardeners, florists, millers, grain dealers, transportation companies, college and experiment station workers, etc. Illustrated. 313 pages. 5 x 7 inches. Cloth. $1.00

Diseases of Swine

By Dr. R. A. Craig, Professor of Veterinary Medicine at the Purdue University. A concise, practical and popular guide to the prevention and treatment of the diseases of swine. With the discussions on each disease are given its causes, symptoms, treatment and means of prevention. Every part of the book impresses the reader with the fact that its writer is thoroughly and practically familiar with all the details upon which he treats. All technical and strictly scientific terms are avoided, so far as feasible, thus making the work at once available to the practical stock raiser as well as to the teacher and student. Illustrated. 5 x 7 inches. 190 pages. Cloth. $0.75

Spraying Crops—Why, When and How

By Clarence M. Weed, D.Sc. The present fourth edition has been rewritten and set throughout to bring it thoroughly up to date, so that it embodies the latest practical information gleaned by fruit growers and experiment station workers. So much new information has come to light since the third edition was published that this is practically a new book, needed by those who have utilized the earlier editions, as well as by fruit growers and farmers generally. Illustrated. 136 pages. 5 x 7 inches. Cloth. $0.50

Successful Fruit Culture

By SAMUEL T. MAYNARD. A practical guide to the cultivation and propagation of Fruits, written from the standpoint of the practical fruit grower who is striving to make his business profitable by growing the best fruit possible and at the least cost. It is up-to-date in every particular, and covers the entire practice of fruit culture, harvesting, storing, marketing, forcing, best varieties, etc., etc. It deals with principles first and with the practice afterwards, as the foundation, principles of plant growth and nourishment must always remain the same, while practice will vary according to the fruit grower's immediate conditions and environments. Illustrated. 265 pages. 5 x 7 inches. Cloth. $1.00

Plums and Plum Culture

By F. A. WAUGH. A complete manual for fruit growers, nurserymen, farmers and gardeners, on all known varieties of plums and their successful management. This book marks an epoch in the horticultural literature of America. It is a complete monograph of the plums cultivated in and indigenous to North America. It will be found indispensable to the scientist seeking the most recent and authoritative information concerning this group, to the nurseryman who wishes to handle his varieties accurately and intelligently, and to the cultivator who would like to grow plums successfully. Illustrated. 391 pages. 5 x 7 inches. Cloth. $1.50

Fruit Harvesting, Storing, Marketing

By F. A. WAUGH. A practical guide to the picking, storing, shipping and marketing of fruit. The principal subjects covered are the fruit market, fruit picking, sorting and packing, the fruit storage, evaporation, canning, statistics of the fruit trade, fruit package laws, commission dealers and dealing, cold storage, etc., etc. No progressive fruit grower can afford to be without this most valuable book. Illustrated. 232 pages. 5 x 7 inches. Cloth. $1.00

Systematic Pomology

By F. A. WAUGH, professor of horticulture and landscape gardening in the Massachusetts agricultural college, formerly of the university of Vermont. This is the first book in the English language which has ever made the attempt at a complete and comprehensive treatment of systematic pomology. It presents clearly and in detail the whole method by which fruits are studied. The book is suitably illustrated. 288 pages. 5 x 7 inches. Cloth. $1.00

Animal Breeding

By THOMAS SHAW. This book is the most complete and comprehensive work ever published on the subject of which it treats. It is the first book which has systematized the subject of animal breeding. The leading laws which govern this most intricate question the author has boldly defined and authoritatively arranged. The chapters which he has written on the more involved features of the subject, as sex and the relative influence of parents, should go far toward setting at rest the wildly speculative views cherished with reference to these questions. The striking originality in the treatment of the subject is no less conspicuous than the superb order and regular sequence of thought from the beginning to the end of the book. The book is intended to meet the needs of all persons interested in the breeding and rearing of live stock. Illustrated. 405 pages. 5 x 7 inches. Cloth. . . . $1.50

Forage Crops Other Than Grasses

By THOMAS SHAW. How to cultivate, harvest and use them. Indian corn, sorghum, clover, leguminous plants, crops of the brassica genus, the cereals, millet, field roots, etc. Intensely practical and reliable. Illustrated. 287 pages. 5 x 7 inches. Cloth. $1.00

Soiling Crops and the Silo

By THOMAS SHAW. The growing and feeding of all kinds of soiling crops, conditions to which they are adapted, their plan in the rotation, etc. Not a line is repeated from the Forage Crops book. Best methods of building the silo, filling it and feeding ensilage. Illustrated. 364 pages. 5 x 7 inches. Cloth. $1.50

The Study of Breeds

By THOMAS SHAW. Origin, history, distribution, characteristics, adaptability, uses, and standards of excellence of all pedigreed breeds of cattle, sheep and swine in America. The accepted text book in colleges, and the authority for farmers and breeders. Illustrated. 371 pages. 5 x 7 inches. Cloth. $1.50

Clovers and How to Grow Them

By THOMAS SHAW. This is the first book published which treats on the growth, cultivation and treatment of clovers as applicable to all parts of the United States and Canada, and which takes up the entire subject in a systematic way and consecutive sequence. The importance of clover in the economy of the farm is so great that an exhaustive work on this subject will no doubt be welcomed by students in agriculture, as well as by all who are interested in the tilling of the soil. Illustrated. 5 x 7 inches. 337 pages. Cloth. Net . . $1.00

Greenhouse Construction

By Prof. L. R. Taft. A complete treatise on greenhouse structures and arrangements of the various forms and styles of plant houses for professional florists as well as amateurs. All the best and most approved structures are so fully and clearly described that any one who desires to build a greenhouse will have no difficulty in determining the kind best suited to his purpose. The modern and most successful methods of heating and ventilating are fully treated upon. Special chapters are devoted to houses used for the growing of one kind of plants exclusively. The construction of hotbeds and frames receives appropriate attention. Over 100 excellent illustrations, especially engraved for this work, make every point clear to the reader and add considerably to the artistic appearance of the book. 210 pages. 5 x 7 inches. Cloth. $1.50

Greenhouse Management

By L. R. Taft. This book forms an almost indispensable companion volume to Greenhouse Construction. In it the author gives the results of his many years' experience, together with that of the most successful florists and gardeners, in the management of growing plants under glass. So minute and practical are the various systems and methods of growing and forcing roses, violets, carnations, and all the most important florists' plants, as well as fruits and vegetables described, that by a careful study of this work and the following of its teachings, failure is almost impossible. Illustrated. 382 pages. 5 x 7 inches. Cloth. $1.50

Fungi and Fungicides

By Prof. Clarence M. Weed. A practical manual concerning the fungous diseases of cultivated plants and the means of preventing their ravages. The author has endeavored to give such a concise account of the most important facts relating to these as will enable the cultivator to combat them intelligently. 90 illustrations. 222 pages. 5 x 7 inches. Paper, 50 cents; cloth $1.00

Mushrooms. How to Grow Them

By William Falconer. This is the most practical work on the subject ever written, and the only book on growing mushrooms published in America. The author describes how he grows mushrooms, and how they are grown for profit by the leading market gardeners, and for home use by the most successful private growers. Engravings drawn from nature expressly for this work. 170 pages. 5 x 7 inches. Cloth. $1.00

The New Egg Farm

By H. H. Stoddard. A practical, reliable manual o. producing eggs and poultry for market as a profitable business enterprise, either by itself or connected with other branches of agriculture. It tells all about how to feed and manage, how to breed and select, incubators and brooders, its labor-saving devices, etc., etc. Illustrated. 331 pages. 5 x 7 inches. Cloth. $1.00

Poultry Feeding and Fattening

Compiled by G. B. Fiske. A handbook for poultry keepers on the standard and improved methods of feeding and marketing all kinds of poultry. The subject of feeding and fattening poultry is prepared largely from the side of the best practice and experience here and abroad, although the underlying science of feeding is explained as fully as needful. The subject covers all branches, including chickens, broilers, capons, turkeys and waterfowl; how to feed under various conditions and for different purposes. The whole subject of capons and caponizing is treated in detail. A great mass of practical information and experience not readily obtainable elsewhere is given with full and explicit directions for fattening and preparing for market. This book will meet the needs of amateurs as well as commercial poultry raisers. Profusely illustrated. 160 pages. 5 x 7½ inches. Cloth. . . . $0.50

Poultry Architecture

Compiled by G. B. Fiske. A treatise on poultry buildings of all grades, styles and classes, and their proper location, coops, additions and special construction; all practical in design, and reasonable in cost. Over 100 illustrations. 125 pages. 5 x 7 inches. Cloth. $0.50

Poultry Appliances and Handicraft

Compiled by G. B. Fiske. Illustrated description of a great variety and styles of the best homemade nests, roosts, windows, ventilators, incubators and brooders, feeding and watering appliances, etc., etc. Over 100 illustrations. Over 125 pages. 5 x 7 inches. Cloth. $0.50

Turkeys and How to Grow Them

Edited by Herbert Myrick. A treatise on the natural history and origin of the name of turkeys; the various breeds, the best methods to insure success in the business of turkey growing. With essays from practical turkey growers in different parts of the United States and Canada Copiously illustrated. 154 pages. 5 x 7 inches. Cloth. $1.00

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

SB
339
T85
1918

Biological
& Medical

Troop, James
Melon culture